

# studio sound

August 1980 75p

AND BROADCAST ENGINEERING



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**EDITOR**  
ANGUS ROBERTSON

**ASSISTANT EDITOR**  
NOEL BELL

**PRODUCTION ASSISTANT**  
ANN HORAN

**CONSULTANT**  
HUGH FORD

**SECRETARY**  
WENDY MARSHALL

**ADVERTISEMENT MANAGER**  
PHIL GUY

**PUBLISHER**  
DOUGLAS G. SHUARD

**Editorial and Advertising Offices:**

LINK HOUSE, DINGWALL AVENUE,  
CROYDON CR9 2TA, GREAT BRITAIN

Phone: 01-686 2599

International: +44 1 686 2599

Telex: 947709

Telegrams: Aviculture Croydon

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# studio sound

## AND BROADCAST ENGINEERING

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At precisely midnight on May 31, the British Musicians Union called a strike of the 551 musicians employed by the BBC, and requested its 41,000 MU members not to accept work with the BBC, resulting in no play-out music on a live programme that started before midnight, but finished after — the only regular television programme with live theme music (*Saturday Night at the Mill*). The strike came about because as a result of expenditure cuts (forced because the Government is not prepared to raise the BBC's licence fee to cover inflation), the BBC announced its intention to disband five of the 11 full time orchestras which provide music mainly for Radios 2 and 3, providing a job saving of 172 on the total of 551, a 30% cut in posts.

The BBC currently spend £6.5m on 'music making' including £4.5m on house orchestras, and after the reduction will still spend £6m, including increased sums on freelance musicians (the vast number in Britain). The effective cut is 8%, not unsimilar to cuts that most BBC departments are being subjected to, due to lack of licence fee funds, however, it does entail a 30% cut in posts. The BBC currently has four house symphony orchestras, of which one will be lost, all paid for by the British television licence, with 22 posts being subsidised externally. There are few other countries in the world that still employ such large numbers of full time musicians (who are considered the elite by some other musicians, having a regular job and salary). Indeed, while commercial television and radio in Britain has a rather larger income than the BBC (from advertising which rises substantially each year, unlike the licence fee), there are no full time musicians employed on continuing contracts, the one orchestra (Capital's Wren) being freelance players.

While ITV merely employ musicians as required, ILLR has to spend a minimum of 3% of its net advertising revenue on musical employment (as opposed to playing records 24 hours a day, which would be rather easier of course). In the 6½ year life of ILLR, £3m has so far been spent on musical employment.

One other reason for the BBC's decision to cut the house orchestras is the desire for a wider range of music than can be provided internally, just as most actors are freelance — can you imagine a 'house' punk band trying to play different music? Naturally they are brought in for a particular programme, to which their music is suited. However, the MU disputes this suggestion. But if the BBC can no longer afford to support all these orchestras, perhaps they should follow the course of sport and obtain sponsorship — so then we could have, for instance, the Benson & Hedges Welsh Symphony Orchestra, or the Marlborough Studio Players!

So far, several live concerts have been lost on Radio 3, and replaced by records, and *Top of the Pops*, has also been lost from television — although here only the record business and musicians will lose since a slot on TOTP is said to guarantee several thousand record sales the following day, and provides many bands with much needed exposure.

How the strike, which is overwhelmingly supported by the whole MU membership, will be resolved remains to be seen at the time of going to press, but the principal people losing out are freelance musicians (often on the breadline anyhow), who are being replaced by records quite satisfactorily — breaking the MU's own slogan of 'Keep Music Live'!

Cover of BGW, Crown/Amcron, Quad and Tresham (PA:CE) solid state amplifiers, and Michaelson & Austin valve (tube) amplifier, by Paul Burbridge and Ray Hyden.

ISSN 0144-5944

AUGUST 1980 VOLUME 22 NUMBER 8

# AKG

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The CMS system also includes short and long extension tubes and gadgets for assembling several pre-amplifiers, for binaural recording, stereo, quadrophonic and sound field applications. For high intensity sound pick-up two attenuation pads may be inserted between microphone head and pre-amplifier. The CMS system should be phantom powered from the associated equipment (any DC-voltage from 7.5 to 52 V will do), but power-supplies are also available (battery, mains for 2 mics, mains for 6 mics).



Picture shows one application for TV boom mount, with rumble filter on and cardioid pick-up pattern (H 15 + CK 1 + C 451 EB + W 17).  
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A specially shaped, short, fine ribbon accounts for its absolute fidelity. With a weight of only 0.000438 of a gram and a thickness of only 0.002 mm, it has an extraordinarily fast and flat response.

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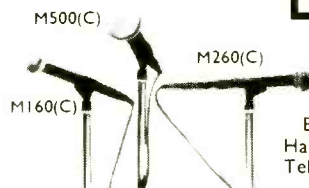
You'll also appreciate the microphone's excellent antifeedback characteristics over the whole frequency range.

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# focus on I.T.A.



panies have accounts with I.T.A. A six figure stock level ensures rapid delivery from a very wide range of products which include tape recorders (mono to 24 track), mixers, tape duplicators, signal processors and tape. Most items are on permanent display in the showroom, which is conveniently located, one minute from Marylebone Station with good parking.

In addition to supplying individual items of equipment, complete studio systems are catered for, from small 4 or 8 track demo-type applications, to the high-technology 24 track full-scale installation. 40% of turnover is exported to over 30 countries from Iceland to

India, and Norway to New Zealand. European distribution is handled through a subsidiary company based in Paris.

The list of customers includes all the top recording studios plus some rather sur-

For almost a decade, I.T.A. has provided the recording industry with a comprehensive facility for the supply and maintenance of a large range of equipment. Originally specialising in semi-professional products, the company now supplies everything from a 24 track recorder to a reel of tape, and the back-up facilities have expanded rapidly to cope with the demands of the largest studios.

In addition to an in-house service department, a 999 service is provided for the more sophisticated equipment which has to be maintained on site. This operates nationwide, in fact quite literally from Lands End to northern Scotland. To cope with the requirements of studios running 24 hours a day,



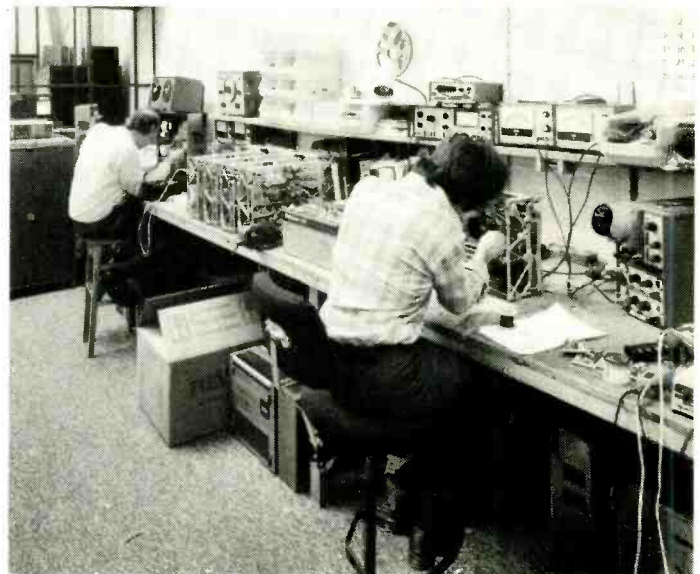
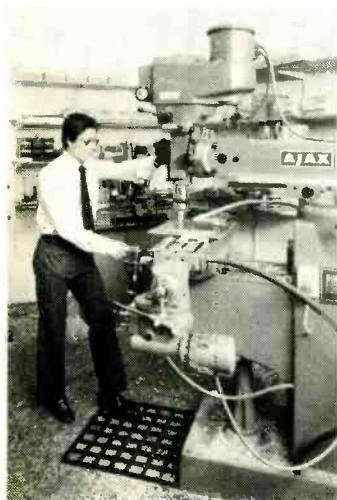
a massive inventory of spare parts and components (currently numbering over 250,000 individual items) is held at Harewood Avenue.

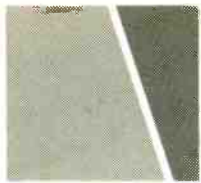
Coping with the latest advances in electronic and electro-mechanical design requires a high level of expertise. Backing up the engineering staff, many of whom have factory training behind them are the latest innovations in test equipment. An extra facility is the machine shop, which was totally re-equipped in 1979 with the most modern lathes, milling machines and drills, thus giving I.T.A. a truly total in-house capability — a unique advantage.

To maximise customer convenience, over 1,000 com-



prising names like Rolls-Royce, British Gas, National Coal Board, C.E.G.B., Ministry of Defence. On a lighter note there's The Who, Queen, The Police, Pink Floyd, to name but a few. Other areas served include Universities (UK and Overseas), Broadcasting Companies, even the Royal Courts of Justice.





# fact: the SC39 Series meets all the unique demands of professional cartridge users

- Broadcasting
- Recording
- Disco
- Transcription and other professional uses

**The Professional Challenge:** Undistorted playback, even of the toughest-to-track, "hottest" recordings.

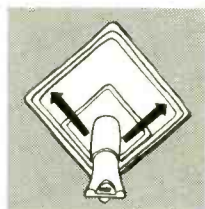
**The SC39 Solution:** The Shure-designed shank structure and bearing assembly gives trackability up to and beyond the theoretical cutting velocities of today's recordings. Frequency response is essentially flat across the audio spectrum, optimized for professional applications.

**The Professional Challenge:** Day-in, day-out rigours of slip-cuing, backcuing, and the inevitable stylus abuse that comes with the job.

**The SC39 Solution:** The internal support wire and special elastomer bearing ensure stable and accurate backcuing without groove jumping. This, plus the following exclusive features, protect the SC39 from accidental stylus damage.

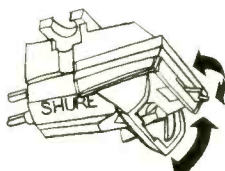
## SIDE-GUARD Stylus Deflector

A unique lateral deflection assembly prevents the most common stylus damage by withdrawing the entire stylus shank and tip safely into the stylus housing before it can be bent.



## FLIP-DOWN Locking Stylus Guard

The exclusive lever-operated, locking stylus guard gives the stylus tip positive protection when not in use. With the flip of a lever, it snaps out of the way, and positions a highly visible cueing aid.



**The Professional Challenge:** Prolonged record (and lacquer master) playability without objectionable noise buildup.

**The SC39 Solution:** A unique Shure MĀSAR™ stylus tip is designed to minimize noise and cue-burn on records. Tests on lacquer masters show that the noise level on a record played repeatedly with an unworn Shure MĀSAR tip is significantly below that of a similar disc played with an unworn conventional stylus. The SC39 also reduces noise buildup on 45 rpm records made from reprocessed or substandard vinyl.



**The Professional Challenge:** A multiplicity of different applications, which no one cartridge can satisfy.

**The SC39 Solution:** The SC39 Series consists of the following three cartridges, for every professional and high fidelity application:

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SC39B	Spherical		

## The SC39 Series Professional Pickup Cartridges



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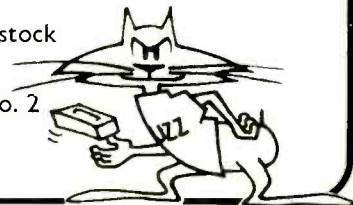
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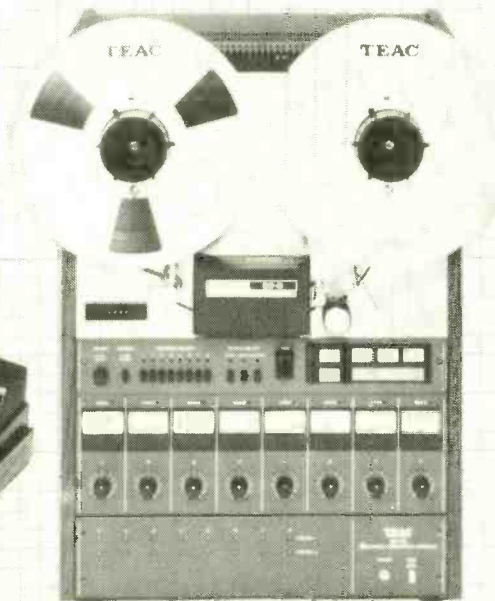
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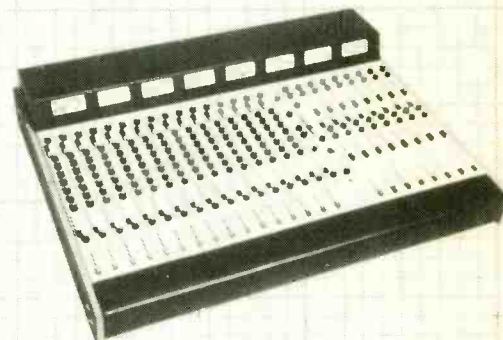
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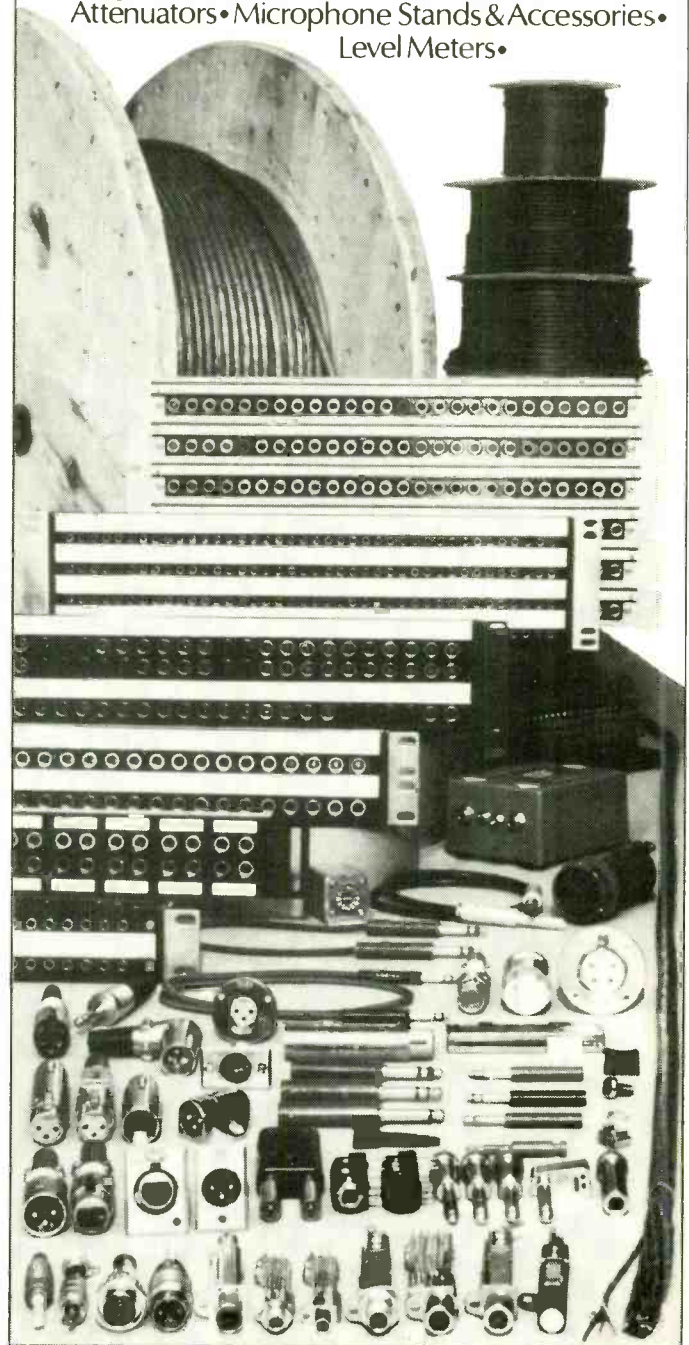
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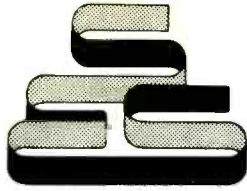
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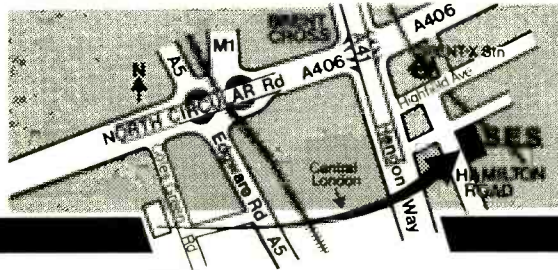
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Angus McKenzie (March 1978)

# REVOX

For the full story contact F.W.O. Bauch Ltd., 49 Theobald St., Boreham Wood, Herts. WD6 4RZ

# Mercia Sound is all Alice



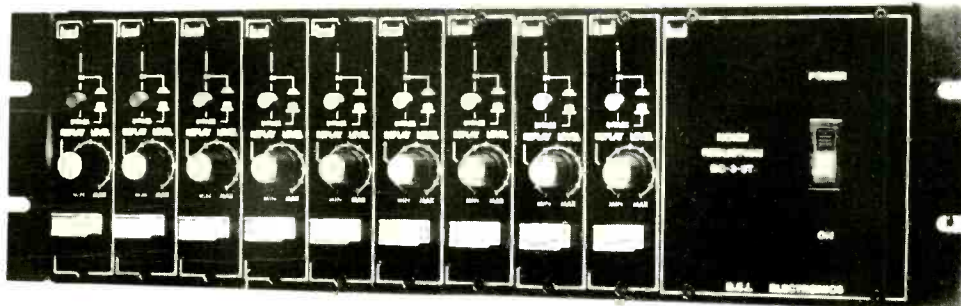
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## Meyer Sound Labs

To commemorate its first year in business Meyer Sound Laboratories held an open house at its San Leandro plant. Interested Bay Area sound-persons were entertained with champagne (Californian, of course!) and an introduction to the *UltraMonitor System*. This consists of two wedge type bi-amplified stage monitor cabinets and associate control electronics — buyers supply their own power amplifier. Compact and conventional in appearance (14 x 14 x 22½in) this monitor is capable of output levels of 125dB continuous and 135dB peaks with less than 1% distortion. This is achieved through the use of a proprietary horn design and higher compliance in the hf driver than is usually encountered in a horn-loaded system. The resulting resonance is electronically compensated and the result is a distortion figure well below the theoretical minimum for conventional designs. The *M-1* control electronics package, as well as providing a 12dB/octave crossover at 1kHz, also includes lf and hf limiters and a level-dependent low-pass filter which reduces the bandwidth under extreme conditions to 8kHz. Another useful feature is a -20dB sensitivity switch for the limiter — invaluable for set-up and mic checks. Proof of the systems viability, even at the price of \$6,544, can be found in a list of users. Filmways/Heider has bought three systems and used them for the



Grammy Awards telecast — Bob Dylan is reputed to have complained that they were too loud, an uncommon fault with monitor systems. Jefferson Starship have a system on tour, the Grateful Dead have a system, and two clubs in the Bay Area are using the *Ultra-Monitor* in conjunction with Meyer subwoofers as house PA.

The ACD/Meyer studio monitor system which debuted at AES Los Angeles, 1979 has a matched pair of subwoofers, designed to extend the power bandwidth down to 25Hz. When asked to provide the lf reproduction system for the screening of *Apocalypse Now* in San Francisco, Meyer redesigned the subwoofer system to be integrated into a 6-channel Altec *A-4* cinema system. 130dB at 50Hz at 1m was achieved and American Zeotrope the film's producers contracted FM Productions of San Francisco to install Meyer subwoofers in all the

first-run houses that would be showing *Apocalypse Now*. John Meyer's designs have always been distinguished by high spl and clarity from surprisingly small enclosures; his *JMH3* concert system designed for McCune Sound in 1972 is still ahead of its several imitators in power/weight ratio and is used exclusively by such discerning clients as Burt Bacharach and Abe Jacobs (sound designer of *Evita*, *Beatlemania* and *Jesus Christ Superstar*). Even the notorious acoustics of the Houston Astrodome were recently conquered by a McCune team using Meyer designed *JM-10* and *JM-3* concert systems, a combination favoured by the Grateful Dead at a recent series of concerts in Los Angeles.

Chris Michie

Meyer Sound Laboratories Inc, 2194 Edison Avenue, San Leandro, Cal 94577, USA. Phone: (415) 569-2866.

## Neal-Ferrograph new products

Neal-Ferrograph has introduced two new products, the Ferrograph *Penthouse Studio 8* ¼in 2-track professional mastering or broadcast tape recorder and the Neal *312* stereo cassette recorder. The *Penthouse Studio 8* is housed in a sturdy three position stand with the facility to access the deck and electronics without removing the machine from the stand or casing, and with the tape transport mounted on a robust aluminium casting. Features of the recorder include dc servo controlled motors for both run and spooling modes with constant tape tension; full editing facilities including 'Dump Edit'; a return to zero facility; realtime LED display in minutes and seconds; fibre optic monitoring of tape functions; easily accessible bias and equalisation controls; controlled fast spooling in either direction; and line-in/line-out or full mixing/monitoring. The Neal *312* stereo cassette recorder is based on the earlier *302* and incorporates the new Dolby *HX* headroom extension system plus the facility to handle metal tape. The recorder features 3-motor logic controlled transport; full remote control; pro-

grammed operation; full calibration facilities; three pairs of inputs/outputs; and new Sen-alloy heads for extended head life. Incidentally, owners of the Neal *302* can have their machines updated to include

Dolby *HX* and the metal tape facility by the manufacturers.

Neal-Ferrograph, Simonside Works, South Shields, Tyne and Wear NE34 9NX, UK. Phone: 0632 566321.



## Sound International

Our sister magazine, musicians' monthly *Sound International* undergoes some big changes shortly. From the August 1980 issue, the magazine will incorporate the well-known British music monthly, *Beat Instrumental*. *BI* was the original British music magazine, and the incorporation of *BI* with *Sound International* will give the publication probably the largest following of any UK-based music magazine. *Sound International*, one of the most respected magazines in the music industry, will continue its unique coverage of the small-scale recording aspects of the industry, but more editorial space will permit an unparalleled coverage of the

## APRS 'Conditions of Hire of Recording Studios'

After three years of discussions between the executive of the APRS, its legal advisers and the Office of Fair Trading, the APRS has released to its members an updated edition of its 'Conditions of Hire of Recording Studios'. The new contracts, which are copyright the APRS (and may only be used by members), are designed to safeguard the interests of members by setting out well defined conditions of hire to prospective customers. An important addition to the new conditions is limited liability in the event of damage or delay in delivery of a tape. Another new clause limits to £10,000 the claim that a customer can make on a studio in respect of any master tape. Hitherto the majority of recording studios were unprotected and could be faced with unlimited damages, either because of no express term to this effect being included in the contract of hire, or by reason of subsequent changes in the law (in particular the Unfair Contracts Act, 1979) This new clause also provides a means whereby APRS members may insure a master tape for a specified larger sum, at the customer's option and expense.

Other clauses give APRS member studios the right to dispose of tapes after six months, provided the procedure for notifying a customer is carefully followed, and also for a studio to retain copyright in a recording until the customer has paid its bill. This latter clause also enables an APRS member studio to bring pressure to bear on a record company using or proposing to use a tape if a non-paying customer subsequently tries to sell it. Further details of APRS membership and the new conditions of hire may be obtained from the APRS Secretary, Edward Masek, 23 Chestnut Avenue, Chorleywood, Herts WD3 4HA. Phone: 09327 72907.

music industry (playing, news, features and reviews) for the amateur, semi-pro and professional musician.

The new-look *Sound International* will be available at all good newsagents in the UK and on annual subscription. Says Editor Richard Elen, "The emphasis will be firmly on the musician, whether he's been in the industry for years or is thinking of buying his first drum-kit. If he plays in his bedroom, in the local club, or in the greatest halls in the world, *Sound International* is the monthly he needs, for the combination of up-to-date news, techniques and unbiased reviews that has made both magazines famous in the past. If you're a musician, you can't afford to miss it!"



# And now... the new improved Eventide Harmonizer: Model H949\*

Eventide's new Model H949 starts where the H910 left off...with outstanding new features like time reversal, randomised delay, flanging and repeat. New digital circuitry and random access memories now actually transpose input signals by one full octave up and no less than two full octaves down.

- \* Two outputs, each with up to 400 ms of delay.
- \* Two selectable algorithms to optimize pitch change performance.
- \* Micro pitch change ensures extremely precise, stable settings.
- \* Long delay permits simulated reverb.
- \* High and low feedback equalization, coupled with the use of delay and pitch change makes possible a range of special effects hitherto unobtainable.
- \* 15 kHz band width.
- \* 96 dB dynamic range.
- \* Dual colour LEDs give markedly improved front panel readability.
- \* Switchable 115/240 volts.



\* Harmonizer is a trade mark of Eventide Clockwork Inc.



UK Distributors

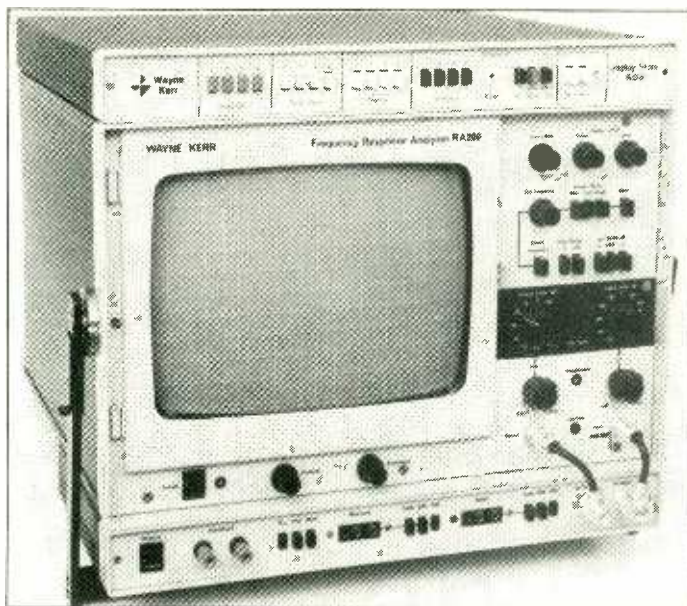
**Feldon Audio Ltd.,**

126 Great Portland Street, London W.1. Tel: 01-580 4314. Telex: London 28668.



### Wayne Kerr ALM1

Wayne Kerr has introduced the *ALM1* line measurement adaptor to accompany the company's *RA200* frequency response analyser and *ADSI* digital display store. With the *ALM1* added the system provides automatic curve plotting, storage and analysis when checking telephone networks and transmission lines or general speech and music circuits. The extended system allows impedance, return loss, frequency response and level measurement. Specifications of the *ALM1* are: input level range  $-80\text{dB}$  to  $+10\text{dB}$ ; frequency range  $20\text{Hz}$  to  $20\text{kHz}$ ; and input impedance  $600\Omega$ ,  $950\Omega$  and High. The oscillator covers the range  $-50\text{dB}$  to  $+10\text{dB}$ . The impedance facility has a range of  $200\Omega$  to  $4\text{k}\Omega$  at any phase angle from  $+90^\circ$  to  $-90^\circ$ ; a frequency range of  $100\text{Hz}$  to  $10\text{kHz}$ ; and display is a modulus of impedance. The return loss facility has an impedance range of  $400\Omega$  to  $2\text{k}\Omega$ ; a return loss range



of  $0$  to  $50\text{dB}$ ; and a frequency range of  $100\text{Hz}$  to  $10\text{kHz}$ . Wayne Kerr, Wilmot Breeden Elec-

tronics Ltd, Durban Road, Bognor Regis, Sussex PO22 9RL, UK. Phone: 02433 25811.

### New record plant flooring

A special dustless, impact-resistant flooring product has recently been laid in the new CBS record manufacturing plant in Aylesbury. The  $2,000\text{sqm}$  concrete floor of the record press room has been laid with a dustless, abrasion- and impact-resistant  $12\text{mm}$  surface called *Wearprufe* manufactured by Shell Composites Ltd. This flooring which has a high compressive strength is ideal for accepting the impact and vibration of automatic vertical-loaded presses. In addition, its abrasion-resistant qualities allows maintenance to be carried out without damaging the floor. Fur-

thermore, the dustless requirement is vital in a record producing area. *Wearprufe* consists of ordinary Portland cement, mixed aggregates and a polymer binder laid on a bond coat. On top of this two coats of *Eponite* clear sealer are applied to provide a glossy slip-resistant finish which is easy to keep clean. Another Shell Composites product, *Eponite G23*, has been laid for chemical resistance of the concrete floor in the plating department where stampers are made.

Shell Composites Ltd, Galvin Road, Slough SL1 4DL, UK. Phone: 0753 71711.

### New Electro-Voice mic shock mount

A new shock mount clamp, designated the *313A*, has been introduced by Electro-Voice. The unit has the outward appearance of a normal stand clamp rather than the 'spider-type' shock mount. Designed to hold mics with a barrel diameter of approximately  $19\text{mm}$ , the *313A* is made of polycarbonate and metal to withstand the abuse commonly encountered in professional use. The shock mount holds the mic by four replaceable urethane bands and a hinged metal latch is provided for applications which require only temporary shock mounting. However, when used with a supplied set screw the *313A* becomes an inexpensive semi-permanent shock mount.

Electro-Voice Inc, 600 Cecil Street, Buchanan, Michigan 49107, USA. Phone: (616) 695-6831.

UK: Electro-Voice Division, Gulton Europe Ltd, Maple Works, Old Shoreham Road, Hove BN3 7EY. Phone: 0273 778401.

### Low voltage continuity tester

A new audio tester for checking the continuity of low dc voltage circuitry, called the *Wailer CT*, has been introduced by Welwyn Tool Co. Ltd. The unit is restricted to intermittent operation and is suitable for most semiconductor circuitry. The tester has a low open-circuit voltage of  $15\text{V}$  and  $2\text{mA}$  short circuit current. When employed for testing dead circuits the device emits a low level audio tone when external circuit continuity is established. If the circuit under test includes an active power source not exceeding  $15\text{V}$  dc and the polarity agrees with the tester's load polarity, a louder audio tone is emitted and a red indicator is illuminated. Should polarities be opposed, the tester remains quiescent. The tester is housed in a plastic case, has an internal  $1.5\text{V}$  power source, and is provided with two test leads.

Welwyn Tool Co Ltd, Stonehills House, Welwyn Garden City, Herts. UK. Phone: 07073 29121.

### Top Score Music

A new partnership, Top Score Music, has been launched to provide an arrangement/composition service covering a wide range of requirements, from jingles and station idents to television and film music. Top Score Music is run by Nigel Paterson and Ian Hughes, the latter having been responsible for the arrangements on Ami Stewart's hits 'Knock on Wood' and 'Light My Fire'.

Top Score Music, 40 Rutland Road, Ilford, Essex IG1 1ER. Phone: 01-478 0661.

### Eventide live Harmonizer

Eventide has introduced the *HM80 Harmonizer* intended for live performance usage. A compact sized and ruggedly constructed unit, the *HM80* features pitch changing from 1-octave up to 1-octave down; delay adjustable from  $0$  to  $270\text{ms}$ ; feedback control; mix of effect and dry signal; repeat; and reverse (a completely new effect). To facilitate live use the repeat and pitch change functions have been made remote controllable. The *HM80* has a frequency range of  $10\text{kHz}$ , a dynamic range of  $80\text{dB}$ , accepts line or guitar level input, and costs  $\$775$ . Eventide Clockworks Inc, 265 West 54th Street, New York, NY 10019, USA. Phone: (212) 581-9290.

UK: Feldon Audio Ltd, 126 Great Portland Street, London W1N 5PH. Phone: 01-580 4314.

### Oval Productions

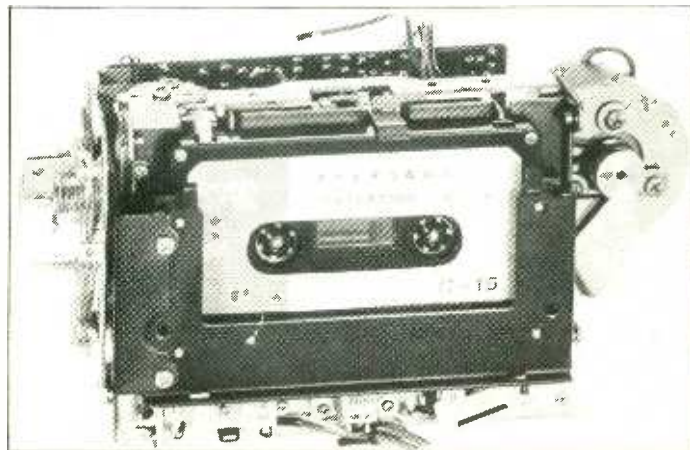
Oval Productions is an American production company headed by Stephen Cohn and Raffaello Mazza which offers a course in recording engineering and record production. Full details of the course syllabus are available from Oval Productions, 2429 Chermoya Avenue, Hollywood, Cal 90068, USA. Phone: (213) 465-9456.

### Symot cassette mechanisms

Symot Ltd has added the new type *C301/147* mechanism to its range of solenoid operated cassette mechanisms. This new mechanism has remote full function operation capability and is suitable for remote digital or analogue data recording. The mechanism uses standard cassettes, is designed for vertical operation and features a flywheel damping mechanism. A 2-speed motor is employed for the drive functions, electronically regulated at low speed for record and playback and switched to a non-regulated mode for rewind

and fast wind. All mechanical functions are controlled by on-board electronics containing logic circuits for full function capability. The function inputs are designed to accept any type of impulse switches and there is an LED indicator output. There are also facilities for auto-rewind and autoplay, switchable in/out as required, and an output for an electronic tape counter. Nominal operating voltage is  $11-16\text{V}$  dc and the size of the mechanism is  $177 \times 100 \times 99\text{mm}$  (wdh).

Symot Ltd, 22A Reading Road, Henley-on-Thames, Oxon RG9 1AG, UK. Phone: 049 12 2663. 22 ▶





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## FCC choose AM stereo system

In a decision announced at the beginning of April the Federal Communications Commission announced that it intends choosing the Magnavox AM stereo system as its AM stereo broadcast standard. The Commission was under strong pressure from the EIA, NAB and members of Congress to choose a single system rather than allowing the four rejected systems (Belar, Harris, Kahn, and Motorola) and Magnavox to fight it out in the marketplace. While the FCC stated that 'the decision in this case to select a single system was prompted by a concern that the new service be made available to the public as quickly as possible', it is unlikely that an AM stereo service will become operative until late 1981. Prior to a final decision being made by the FCC a period of deliberation (and possibly court appeals by proponents of the unsuccessful systems) is to take place. In the meantime Magnavox has stated that it will make its technology and patents available to transmitter and receiver manufacturers on a non-discriminatory basis.

## People

- Otari has appointed Phil Sun as national service manager of its USA office in San Carlos, California.
- Bruce Marlin has joined UREI as assistant sales manager. Bruce was formerly with Westlake Audio.
- Sony Broadcast has appointed three new regional sales managers. They are Keith Dunford (Middle East), Sunuhi Cav (Africa), and Gunter von Cavallar (Austria and Eastern Europe). Gunter von Cavallar will be based in a new sales office in Vienna.

## Address changes

- MXR Innovations Inc has moved to 740 Driving Park Avenue, Rochester, NY 14613, USA. Phone: (716) 254-2910
- The administrative offices of Webland International Ltd and KLH/Burwen (UK) Ltd have moved to 4 Cromwell Place, South Kensington, London SW7 2JJ. Phone: 01-584 7735/6/7.
- Telesco International Corp, the export agent for test instruments manufactured by Potomac Instruments Inc, has moved to 125 Mineola Avenue, Roslyn Heights, NY 11577, USA. Phone: (516) 484-3822.
- MCI Inc has moved into larger premises in response to ever increasing business. MCI Inc, 1400 W Commercial Blvd, Fort Lauderdale, Florida 33309, USA. Phone: (305) 491-0825. Telex: 514362.

## Agencies

- Swedish test instrument manufacturer Consilium Industri AB has appointed Dawe Instruments Ltd as

## RAT music stands

A new and versatile music stand constructed from black nylon covered steel has been introduced by RAT Manufacturing. Produced from a basic stand and a number of interchangeable accessory parts—including music and instrument trays, a pencil tray (facilitating easy music score alteration), demountable single or double bulb lamps (double insulated for maximum safety), and a fully adjustable mic boom—the stand is suitable

## Mic cable tester

Wireworks has introduced the TE-2 mic cable tester which combines all the features of the TE-1 tester plus an additional test mode for checking conductors shorted to the case of XLR type connectors and the facility to accept 1/4 in phono connectors. The TE-2 features LED display of shorts, open circuits and out-of-phase wiring; and is a pocket sized unit powered by a 9V battery with an average test life of over 1,000 cables. Wireworks Corporation, 380 Hillside Avenue, Hillside, New Jersey 07205, USA Phone: (201) 686-7400.

its exclusive UK and Eire agent. Dawe Instruments Ltd are at Concord Road, Western Avenue, London W3 0SD. Phone: 01-992 6751. Telex: 934848.

- MXR has appointed Olson Sales, 1185 Chess Drive, Foster City, Cal 94404, USA, [Phone: (415) 573-1600], as its agent in northern California and northern Nevada.

## Contracts

- Allen and Heath has supplied SR Series sound reinforcement consoles to the Sheffield Fiesta Club and the Alexander Theatre, Birmingham. In addition the Doolies have purchased two consoles as part of their £20,000 sound system update.
- Turnkey Two has designed a new sound system for the Laserium at the London Planetarium. Installation is being carried out by Martin Audio.
- Samuelson Film Services has expanded and modernised its film transfer department with the installation of three 16mm EBU, two 35mm and a 3-track 35mm DIN system. The equipment was supplied and installed by Miniflux Electronics and includes Miniflux 4-channel magnetic recording units with LED peak level indicators for each track format. Similar installations are in operation at BBC Lime Grove and the BBC Wood Lane TV Centre.

- Klark-Teknik has supplied the BFBS with six office programme monitoring systems. The systems are housed in custom consoles and include equipment from Klark-Teknik, Neal-Ferroglyph, Quad and Dual.

for a wide range of applications. The basic stand has a three point solid base, adjustable height, and hooks at the top and bottom of the vertical stem to eliminate trailing wires and provide convenient wiring storage. Due to their shape the stands can be stacked adjacent to each other so that for example some 50 stands can comfortably be stored in a floor area 3m x 0.6m. RAT Manufacturing, 17/18 Great Sutton Street, London EC1, UK. Phone: 01-251 2437.

## Soundex audio multimeter

An addition to the range of products manufactured by Bulgin Electronics Soundex Ltd is the new AMM100 hand held audio multimeter. The AMM100 will measure signal levels from -72dB to +22dB and uses the PPM measurement technique to BS5428. The multimeter is housed in a tough plastic case and has eight pushbutton gain switches (-60dB to +10dB in 10dB steps); a calibrated/uncalibrated range switch and variable range control; a 600Ω input termination switch; battery check facility; on/off switch; signal input and output jacks; and a headphone jack. The PPM uses the standard 1-7 scale, however, the multimeter is optionally available with an EBU (-12 to +12) meter scale. Input impedance is either 100kΩ or 600Ω balanced, while the output impedance is approximately 50Ω. Accuracy is quoted as ±0.1dB. The multimeter is powered by a rechargeable battery, but also has a built-in mains adapter. Price of the AMM100 is £193. Bulgin Electronics Soundex Ltd, Park Lane, Broxbourne, Herts EN10 7NQ, UK. Phone: 09924 64455.

## MCI JH-24

Introduced in the USA in January, the new MCI JH-24 multitrack recorder is now available in the UK. The JH-24 is available in 8-, 16-, or 24-track versions and features totally transformerless electronics including differential inputs, outputs, and head coupling; separate pre-amplifiers and equalisers for repro and sync; QUIOR (Quiet Initiation of Record) circuitry; phase compensation; full track width erasure (-80dB at 1kHz); automatic input/output switching; and spot erase capability. Designed to replace the JH-16 multitrack, the JH-24 uses a dc servo-controlled JH-114 transport which will accept NAB reels up to 14in, operates at 15 or 30 in/s, and has a phase locked capstan motor and torque limit switching. Quick change head assemblies allow for fast track and 1 and 2in tape format conversion. Remote control of the transport and electronics is standard equipment, while the AutoLocator III and JH-45 Auto-lock SMPTE/EBU tape synchroniser may be added as accessories. The JH-24 incorporates electronics similar to those in the JH-110B Series providing increased headroom of 30dB (at 1kHz ref 250nWb/m) and increased frequency response to 26kHz. NAB or CCIR operation is channel selectable. A further feature is that by establishing bias frequency at 210kHz and erase frequency at 105kHz, this has allowed the use of higher bias frequency while maintaining erase efficiency.

MCI Inc, 1400 W Commercial Blvd, Fort Lauderdale, Florida 33309, USA. Phone: (305) 491-0825  
 UK: MCI Ltd, MCI House, 54-56 Stanhope Street, London NW1 3EX. Phone: 01-388 7867.



## Klark-Teknik move

Klark-Teknik Research Ltd has moved into new custom-built premises on the Coppice Trading Estate, Kidderminster, Worcs. The new 8,000sq ft factory includes offices, an acoustically-treated 'listening room', a microprocessor development laboratory, and extensive test and production facilities. Klark-Teknik are launching several new products this year and according to managing director Philip Clarke the

company intends continuing its rapid expansion (a 100% increase in turnover is expected during the next 12 months). To cope with projected growth, work has already started on a further 20,000sq ft factory development which should be completed by Spring 1981.

Klark-Teknik Research Ltd, Coppice Trading Estate, Kidderminster, Worcs DY11 7HJ, UK. Phone: 0562 741515. Telex: 339821.





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# studio diary



## Music Land Studios, Munich

With a customer list that reads like a Who's Who of rock, Music Land are the studio that brought — and still bring — the 'Munich sound' to British rock. Though some American artists have been in, it is groups like Deep Purple, Rainbow, ELO, Jeff Beck, The Stones et al who firmly established Munich onto the international scene. Recent customers have been Amanda Lear, Queen and Elton John. One of the main reasons for Music Land's success was that it was the first Munich studio to start up with British and American recording equipment as well as the established European names. This meant a break with tradition, or more precisely IRT regulations, and made the studio attractive to clients both in and out of Germany. That was in 1973 and since opening, the studio has never looked back. For rock aficionados the logo 'recorded at Music Land' is itself a guarantee of quality and as such is an enviable reputation to have.

The studio itself is situated in the basement of a modern complex known as the Arabellahaus, with the Sheraton Hotel just over the road if that breed of coaching inn happens to turn you on. Access is by what looks like an ordinary service door except for the studio logo painted on in gold. Coming down the long straight staircase one arrives in a small lobby with store-rooms off to the left and the studio to the right. So turn right and into the studio, well, not exactly because here we are in the restaurant! It must be said that German studios have their priorities in the right places and an in-house 24-hour restaurant service is just the thing to keep musicians and engineers happy. The dining room cum relaxation room is done out in a rustic style to remind people that the pace of life used to be otherwise and provides a

change from the hamburger factories. Entry to the control room and studio is from one corner — just by the bar — so I opted for the control room where engineer Hans Menzel was waiting to show me around.

The control room is conservatively decorated with ceiling trapping and matching front and rear wooden walls, though the rear wall does feature a slat absorber. The monitors are Westlake Audio, powered by DC300A's via a White 1/3-octave eq. and have a rather unusual aspect owing to the acoustic lenses in front of the treble units. (In fact the monitors have now been modified to be tri-amplified, using a D150A for the tweeters.) This modification is due to the lack of rear wall bass trapping or side wall rock as would be found in a complete West/Eastlake control room and thus aids the high end dispersion and counteracts reflections from the rear wall. Auxiliary monitoring is provided by a pair of Auratones. The desk is a 3232 Harrison (the first in Munich and possibly in Germany) with Allison 65k programmer and though still giving sterling service, Music Land are looking at the latest generation

Harrisons for possible updating. Recording is on a Studer A80/24 track for most of the time though there is another A80/16 recorder that comes in and out of the studio. For the moment there are no plans to link two multitracks together though if there is sufficient demand it always remains a possibility. Three Studer A80/RC stereo recorders are available for mastering, copying, etc. as well as two Revoxes for doing what everyone does with Revoxes, ie, almost everything.

Coming into the control room one cannot fail to notice what seems to be a complete wall full of rack equipment at first sight, so if it's effects you want, then effects you get! In many ways it would be easier to table a list of what they haven't got rather than the other way round so I'll try and keep it short. Apart from a Scamp rack, the whole of the Audio & Design rack mounting range of equipment must be represented with additional gain reduction courtesy of dbx, Kepex, UREI, Gain Brains and EMT noise filters, not to mention some Roger Mayer noise gates. Not so often found are two Eventide Omnipressors and Quad-Eight noise gates. However, for some people the star of the limiter/compressor show might be the stereo Fairchild 670 that is security bolted into the rack! Covetous eyes have already offered vast sums of money for it but Music Land are hanging onto it. Other signal processing equipment includes UREI graphics as well as a Little Dipper filter set. Orban are also represented. Time domain equipment now includes a Marshall Time Modulator, Lexicon Prime Time and Deltalab DDL. As if this wasn't enough, very flexible reverb-

eration facilities are provided by EMT 250 digital unit and 240 plate, AKG BX20, Master Room reverb and, believe it or not, an actual acoustic echo chamber! Just in case all this leaves you a bit breathless I'll weigh in with the coup de grace and add in the EMS 2000 vocoder, White 1/3-octave spectrum analyser and the Dolby channels consisting of one M24, one M16 and six A361's.

In order to centralise things, all the recorders are remote controlled from the console together with a Studer autolocator for the multi-track(s), as is all the lighting for the studio which must have enough dimmer channels to make a small theatre envious. Thus any mood desired can be created in the control room and/or studio. The job has been done properly as during the demonstration of lighting control there was a complete absence of thyristor buzz. The other point that I feel is worth mentioning is although the studio is down in the depths, they have avoided that closed-in feeling that one sometimes comes across and achieved a low key atmosphere coupled with some spaciousness. Certainly the control room is not overcrowded and there is ample seating both in front of and behind the console without the engineer feeling he is being attacked. OK, it's fine up till now but what does it sound like? Hans played me one or two random selections but was obviously proud when he put on the newly finished master tape of ELO's latest offering that he had recorded. We decided to permit ourselves the luxury of 'putting our feet up' on the desk and letting it roar. Gear doesn't make a studio, you have to know how to use it and the music coming out from the monitors more than amply demonstrated why Music Land have customers who are not one-time-only clients. It was great! OK, so I like ELO but even the most neutral listener would have had to agree that the sound was very solid and clearly defined, without any looseness. It was at this stage of the proceedings that I found the 3ft long stereo light beam meters installed between the monitors really were for real and that customers can see at what level they are deafening themselves! It transpires that in the past certain clients swore that the engineers weren't monitoring loud enough so in desperation the over-size meters were installed. We were averaging around 0VU to +1 for loud passages and it was loud! I asked Hans what happened when it got to +4 and over — "Simple, I leave the room!"

Apparently, Hans is now the only resident engineer at Music Land as

Above: Control room  
Below: Studio





many of the Munich engineers are freelance while many clients want to bring their own favourite engineer. In those cases Hans is there to give a hand or show the ropes — or in the case of the outside engineer being an old Music Land hand, have the day off! On the day of my visit a Dutch band was coming in for a disco session — brass and all — so while Hans started setting up mic stands, etc, I thought it was about time I had a look round the studio itself.

The studio acoustics are courtesy of Sandy Brown Associates and give a pleasant working atmosphere. The treatment is a mixture of ceiling modules and wooden slat absorbers for the walls, with carpeted floor. There are also quite a few movable acoustic screens of various shapes and sizes. The shape of the studio is roughly square though the support pillars tend to divide it into two sections with the result that one side is used more for rhythm instruments and the other for ensemble playing. Foldback to the studio is via two JBL monitors and a custom built Westlake Audio headphone system. The Westlake foldback is stereo or two mono sources which are switchable from the control boxes that serve as headphone distribution points. Each box is 2 x 2 meaning that there are two stereo channels, one each for two pairs of headphones. For each channel there is a stereo, -mono 1, -mono 2 selector switch and individual gain controls for 1 and 2. This way the stereo foldback from the desk can be twiddled to suit each single or pair of musicians' needs and avoids time wasting. Power is provided by several *D150As*.

Microphones available again represent a very broad choice with all of the 'big names' being in stock, ie, Neumann, Schoeps, AKG, EV, Shure, Pearl, Sennheiser, Sony, Beyer. Like all progressive studios, Music Land spend quite a bit of time experimenting with mics and for this session Hans was going to try a pair of Shure *SM33* ribbons for the brass section. (I ought to try and find out how he got on!) Other examples have been putting Ritchie Blackmore's Marshall flat out at the bottom of the stairs and a stereo pair at the top! This coupled with a DI and close mic gave quite interesting results, I'm told.

The session was close to starting so I left Hans to it after thanking him for his time. Music Land are aptly named and it would seem that their citizens are going to stay happy for a good time yet. **Terry Nelson** Music Land Studios, Arabellastrasse 5/139, D-8000 Munich 81, West Germany. Telex: 522393. Phone: 089 92322 700.

## Delta Sound, Cairo

March 1 of this year saw the opening of Egypt's first commercial 16/24 track studio. Delta Sound is associated with the Cairo based Delta Group whose activities include banking, an international business and communications centre, and resort and entertainment facilities.

Driving force behind the studio is Taymor 'Timmi' Kota a reformed bass player of considerable accomplishment who has strong links with the Egyptian musical community. Timmi is part owner and studio manager and although a capable engineer himself, will be entrusting most sessions to his brother Hanni who is also a guitarist and hair-raising motor bike rider. (Jaded visitors will testify to the amazing restorative powers of a dawn ride to the Pyramids.) In the early stages the engineering staff has been augmented by two voluntary exiles: Fred Reynolds from Chicago will be with Delta until August familiarising local staff with studio techniques, and Roger Quested, more usually found engineering at Morgan or Music Works in London, recently spent a month sorting out the problems and frustrations which inevitably accompany the first few sessions in any new studio.

The studio, which was designed by David Rivett of Scenic Sounds Equipment in London, has a floor area of 700sq ft and incorporates extensive bass trapping and a live area. Regrettably ceiling height is a little less than would be ideal, largely because an Egyptian contractor felt that an 18in thick concrete floor slab would be much better than the mere 5in specified! This apart, construction is fairly conventional with floating rubber isolated structures for studio and control room, both of which are fully air conditioned.

*An encouraging smile from a local says that everything will turn out OK*



*The first session takes place bravely in the half built studio*

to find that so many everyday building materials which we take for granted in Europe are simply not available in Egypt. Plasterboard and fibreglass wadding were two major shortages which necessitated the provision of local substitutes. Plasterboard was replaced by high density chipboard and fibreglass by, of all things, the entrails of dozens of flock filled car seats. Bizarre as this may sound the acoustic results are excellent.

All the equipment and interface wiring were supplied by Scenic Sounds Equipment Ltd, whose technical manager Tim Owen undertook the commissioning of the installation in collaboration with David Scherchen of Connexion. Actual run-up was accomplished with few hassles, although shipping equipment into the country was not without its problems, mostly caused by customs officials expressing totally unreasonable doubts that, say, a 6ft long crate weighing 500lb and con-

taining a mixing console or perhaps 30 mike stands and booms really were accompanied personal baggage intended for home use!

The current hardware tally is as follows: Studer *A80* tape machine, Allen and Heath *Syncon* console, HH power amplifiers, JBL and Tannoy monitors, dbx noise reduction and compressor/limiters, Deltalab *DL2 Acousticcomputer* (apparently very popular with musicians), Orban parametric eq *Master Room* reverberation, MXR *Flanger/Doubler*, microphones by AKG, Shure, Beyer, Sennheiser and of course the expected range of Revox, cassette decks and so forth. Plans are already well advanced for the addition of a tape duplicating plant and video facility for which there seems to be a great untapped demand from the whole middle eastern region.

Business is building rapidly and roughly divides into three basic categories: new innovative eastern disco pioneered by young musicians such as Ali el Hagar and Omar Fathy; more conventional Egyptian music played by established local stars like El Amam or Moody and Hussein, and finally a useful base load of TV and radio commercials for firms such as Coca Cola.

The studio is located in a pleasant leafy suburb of Cairo on the Giza side of the Nile (which is about a mile away). There is a bar and relaxation area which is fast becoming a popular musicians gathering place where business and pleasure blend easily away from the truly horrendous cacophony of Cairo traffic.

Delta Sound is certainly a pioneer in the Middle East, and if the enthusiasm and hospitality of the staff are anything to go by, will be an immense success.

**David Rivett**

Delta Sound, 27 Adnan El Medani Street, Madine El Sohafeen, El Doki, Giza, Egypt.



**Indian Creek Recording, Texas**

Starting a studio the size of Indian Creek Recording on a 4,000 acre ranch in the middle of the Texas hill country is in itself a great achievement. 18 months after the first rock was dynamited from the hill, Indian Creek studio is open. The studio is located 80 miles west of San Antonio and is approximately a 20 minute drive north of Uvalde from which visitors and artists are driven via dirt roads and bump gates.

The studio has been constructed on the side of a gently sloping hill. The foundation of the building has been set on bedrock, requiring slab beams as much as 6ft in depth, while five different slab levels have been incorporated for visual, structural and acoustical purposes. The rock walls are integrated with nearly 2,000sq ft of glass, producing a massive yet open look to the studio, control room and offices.

The studio can handle up to 25 musicians, and incorporates a drum booth, vocal booth and separate live booth, all of which can be opened out to achieve total flexibility in the studio. The main studio area is carpeted with all other areas and booths left with the natural rock flooring. There are also acoustical clouds hanging from the ceiling in the main area.

The studio has been designed to record artists from rock'n'roll to country, from producers who require that very tight sound to those who prefer natural ambience on their records.

The control room at first sight looks a little on the small side, but this is not the case when inside. The recorders and electronics are located in the front quarter section of the room enclosed by smoked glass doors, well within view of the engineer, but enclosed to eliminate any effect on room acoustics, noise and undesirable visual impact. Installed is the first Neve console in the state, with recorders currently



*A breath of fresh air—and plenty of it*

being an Ampex MM-1200 24-track (to be replaced in September '80 by the ATR-124), an Ampex 2-track ATR-102 and one 30 in/s 1/2in 2-track mastering ATR-102. Dolby will be available although clients are encouraged not to use it. Monitoring is provided through an array of three UREI 813 Time-Aligned monitors arranged in a 105° arc to provide unusually wide stereo imaging without any 'holes' in the image. Eq is provided by White 1/6-octaves, for house equalisation, backed up with two sets of White 1/3-octave eq custom curves. Reverb is by Lexicon 224 digital units backed with a full array of outboard devices.

Another interesting feature is the 'living room' adjoining the control room. It has full visual and audio contact with the control room allowing musicians freedom to talk and relax without disturbing the engineer and producer, but still allowing

*Carpeted main studio area*



them to keep in close contact with what is happening.

Marty Manry, president of Indian Creek Recording, says "Another unique aspect of the studio is that I have acquired the services of John Rollo from London, England to be the chief engineer. He has worked with producers and artists such as George Martin, Eric Clapton, Dave Davies, Jack Bruce, Cleo Laine and for the past two years has worked at Konk Studios which is owned by the Kinks. He was the first and second recipient of the Ampex Golden Reel awards ever to be presented in England. He recently received a gold record for his engineering work on the Kinks' *Low Budget* album."

The Uvalde area is surrounded with clear spring fed rivers. In close proximity are white sand beaches on the Gulf Coast and the festive Mexican border towns. Amistad Dam, one of the largest man-made dams in the United States, is located in Del Rio and provides excellent water skiing, fishing and scuba diving. The famous Alamo Village proves to be an interesting stop for sightseers. Numerous western pictures, including *Centennial* and *The Alamo* have been filmed at Alamo Village.

Keeping in mind the economical situation of the world, Indian Creek Recording offers a reasonable studio rate of \$100 per hour. In addition, there will be accommodation consisting of a two storey house with six bedrooms, two bathrooms, a kitchen, and living and dining areas available to groups for a minimum fee of \$75 per week. A selection of motels are also available.

Indian Creek Recording, PO Box 487, Uvalde, Texas 78801, USA. Phone: (512) 278-5811/5802.

**Delphine Studios, Paris**

Delphine Studios are located in the centre of Paris, near boulevard Haussmann. They are extremely busy so I was lucky to meet Didier Lize and Olivier Toussaint. Olivier Toussaint and Paul de Seneville are well known as composers and are the owners of the studio. At the beginning Olivier had a small demo studio, with a 3M 24-track recorder! He asked Didier (who had previously worked with Paul de Seneville at Studio 92) to form a small studio and to be his sound engineer. Didier Lize quickly convinced him to expand the plan and had to choose the equipment. Didier is now freelance but usually works at Delphine because things are mostly the way he likes them.

Studio A opened in January 1978 and is located in the cellar of the building, so the bricklayers had to excavate some 30in by hand to avoid vibrations, breast walls had to be moved and the boiler room received the same treatment. The main work was performed under the supervision of the building architect, while Francis Milano (from Acoustic Consultant, ex Sensitive Audio) was chosen by Didier for the acoustics. The control room and studio are built on floating slabs, and the drum booth is also isolated from the studio. Acoustic isolation is very good and there are no problems with the upper floors. The whole cost was near £450,000 (including £100,000 for stonework and £170,000 for recording equipment) and the work took a year. The control room of 380sq ft is spacious while the studio is only 550sq ft. But the studio acoustics are sophisticated. "We find different zones elaborated to make the direct sound of an instrument fall," said Didier, "so the nearness of instruments does not create any problems."

*Delphine Studio A showing drum booth and zone for concert grand*







Control room at Delphine overlooking the studio

There are two booths, one for drums directly opening to the studio (with a retracting glazed door) isolated by its own acoustics, another for acoustic guitars with a variable reverberation time. Then there are two zones: the first allows the Bosendorfer concert grand piano to be recorded without screens on account of a bass trap integrated in the decoration, while the second is a bright zone that works in the low medium, high medium and treble to reduce the aggressiveness of strings while keeping their presence in the lower part of the spectrum.

Didier is very pleased with the acoustics. "We have an atmosphere for the instruments that does not put out," he said. The control room is equipped with a SAJE 36/32 custom designed console. The structure and the choice of modules were settled by Didier. There are 44 parametric modules, 10 echo sends, VCA grouping and mute remote control. Price was near £50,000 and it is a very functional desk.

The tape machines are a 3M 24-track and two Studer 2-tracks (one

A80, one B67). The 24-track runs at 30in/s with Dolby-A. Echo and reverb are provided by EMT 240 plate, Micmix Master Room reverb, AKG BX10, two Revox A77s and a Lexicon digital delay line. Ancillary equipment includes UREI 1176LN and Plus 30 compressors and limiters, Audio & Design Scamp rack, Loft analogue delay, Eventide H910 Harmonizer, Orban De-esser, Kepex noise gates and Aphex. Monitoring is provided by Sensitive Audio OBSI, each comprising two 15in Gauss bass drivers, a 12in Gauss for low-medium and JBL 2440 and 2405 for medium and treble. They are tri-amplified by Phase Linear 400 amplifiers and equalised by Technics. Microphones in use include Neumann U87, U47, KM84, KM88, Sennheiser MD441 and Electro-Voice RE20. Instruments are usually hired, but Delphine offers a beautiful concert grand Bosendorfer, Fender Rhodes, Hohner Clavinet, and Fender Twin reverb.

I asked Olivier Toussaint about his future plans. "I suffer from our success because it is very difficult to find a moment to record my own productions," he said, "but we are now building a second studio, smaller, with another 3M 24-track, 3M 2-track, Dolby-A and an older SAJE desk to allow us to do commercials, demo tapes, and keyboard or guitar re-recordings. 24-24 copying will be easy". Didier Lize then added, "I hope to improve the monitoring system with other equalisers and crossovers, but I am frightened by the poor quality of pressing: we lose treble, there is a lot of noise, and I can say that with singles, the music is really distorted." At the moment, while some major studios have difficulties in Paris, Delphine is very busy and a good example of an effective studio.

Jean Marandet.

Delphine Studios, 5 rue du Docteur Lancereaux, F-75008 Paris. Phone: (1) 754.01.02.

## All Change at Ridge Farm

Since our report on Ridge Farm recording studio last year (Studio Diary, August 1979, page 28) considerable equipment changes have taken place. While the large Elizabethan barn which houses the studio, and the studio itself remain unchanged, the control room has been almost totally re-equipped. Pride of place in the studio now goes to its new Solid State Logic SL4000E Series console. This is a fully automated 40-channel frame model currently with 28 I/O modules, however, this number will be expanded. As with all SL4000E consoles it has comp/limiters and noise gates on each channel.

Tape machines at Ridge Farm are now a Telefunken M15A 24-track with autolocate and varispeed, plus a pair of Ampex ATR-100 machines for mastering. For cassette copies there is also a Technics 9900 unit. Monitoring is over Tannoy Super Red and Lockwood Red monitors

driven by Amcron PSA-2 and Quad 405 power amplifiers, while fold-back is via Beyer DT1000 headphones driven by Quad 405s. The studio's effects units, which are housed in a sweeping curved shaped unit mounted on castors, include an AMS DMX15-80 digital delay line, Eventide Harmonizer, AMS DM2-20 phaser/flanger, an ADR FX760 Compex limiter, and a pair of Lindsay 7607 graphic equalisers. Other ancillary equipment includes an EMT 240 plate, Dolby noise reduction, and a Technics domestic playback/reference system. Microphones are from AKG, Beyer, Electro-Voice, Neumann and Sennheiser. Ridge Farm's re-equipment has made the studio highly desirable as an out-of-town recording venue, and with the availability of residential accommodation and excellent recreational facilities (including a local real ale public house!) it offers one of the most relaxing recording locations in the UK. Ridge Farm, Capel, Nr Dorking, Surrey, UK. Phone: 0306 711571.



Ridge Farm control room

## Studio News

● Bruno Spoerri Recordings (Zurich, Switzerland) has updated its studio with the installation of an MCI 536 automated console, an MCI JH-110A 2-track with autolocator, and a Studer A800 24-track also with autolocate. New ancillary equipment includes the AMS digital delay and pitch shifter, and the Lexicon 224 digital reverb. Future plans include a new large studio to be situated in a farmhouse outside Zurich.

● SARM Studios, London, has added a Lexicon 224 digital reverb unit to its complement of ancillary equipment.

● Marquee Studios, London, has completed reconstruction of its main studio. The reconstruction included 'floating' a new structure complete with full air conditioning containing two isolation rooms, one

of which is built out into an area which was formerly a light well. By including the new area, Marquee has ensured that the usable floor area of the studio remains basically unchanged with a capacity of 35 musicians, but with the added advantage of full sound trapping. Studio reconstruction was undertaken by Eastlake Audio and the control room which has been slightly increased in area now features Eastlake monitoring. The console, tape machines and ancillary equipment remain unchanged.

● Solid Sound, Ann Arbor, Michigan has installed an MCI 636 automated console and JH-16 24-track, making it the first automated studio in Michigan state. The studio which was formerly 16-track, was designed by George Augspurger and has been in operation for five years.

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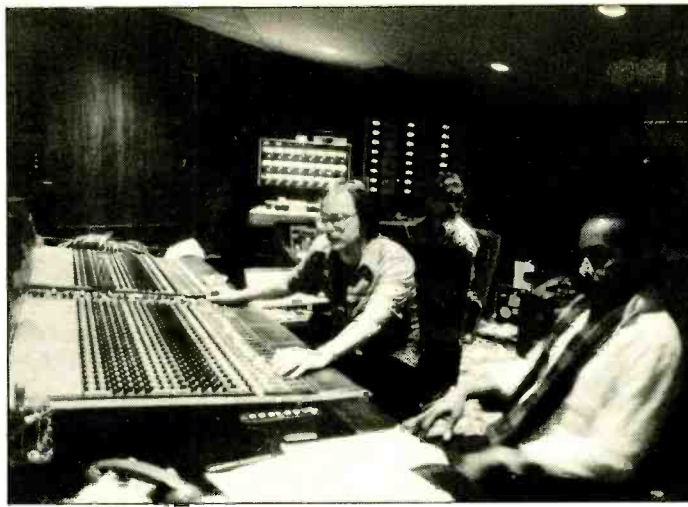
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## Marcus Music revisited

Following my report on Marcus Music UK in our July 1979 issue, I recently had the opportunity to make a return visit to discover how work was progressing on this Swedish import to the London recording scene. While much work still remains to be done — effectively only to the reception area, accommodation areas and offices — the prime reason for my visit in the company of technical manager Bernie Spratt was to see the newly completed large studio.

When I last reported on Marcus, the smaller studio was then known as Studio 1. However, now that its larger counterpart is operational the latter has become Studio 1 and the small studio is now Studio 2. Studio 1 is certainly an impressive sight. Whilst originally it was to have had comprehensive film projection facilities these plans were shelved and it is now mainly devoted to music recording. The studio is one of the largest available in London and is approximately 2,500sq ft in size. Shape of the studio is basically an elongated wedge with the control room at the widest end, a vocal booth alongside to the right and with a live area (which can be sectioned-off by glass sliding doors) at the narrow end. Along the right-hand wall of the studio are a number of amp traps, a piano trap (complete with Yamaha grand) and adjacent to the live area a drum booth. The live area is an interesting section having zinc sheet walls (with painted murals) fixed to plasterboard with a



bass baffle beneath. The sound was extremely alive and understandably this area is ideal for strings. The live area is also spacious and will adequately accommodate up to 30 musicians. Flooring throughout the studio is wood laid on wood joists laid on fibreglass reflecting the style of studio designer Jan Setterberg. Incidentally, studio construction which is to a very high standard is by a new company to this field, Rabbit Ltd. Within the main section of the studio several unusual features were present. Both the walls and ceilings have areas of variable trapping which although hidden by hessian are spotlighted on the studio plans such that engineers can place instruments in particular parts of the studio for particular acoustic characteristics. A useful feature which

overcomes much of the blandness found in some studios.

The control room to Studio 1 like the studio itself is one of the largest I have so far visited. Approximately 30ft across by 25ft deep it is extremely spacious and uncluttered. Pride of place goes to the console, a Harrison 4832 with Allison 65k programmer which is coupled to two Studer A800s and an A80 with the Studer TLS tape controller. Other tape machines for mastering are A80RC machines and all the tape machines use Agfa tape. Incidentally the studio is equipped for 46-track recording. Monitor loudspeakers are custom built to Jan Setterberg's designs using JBL and ATC drivers with 3-way electronic crossover at 300Hz, 3kHz and 8kHz. Tri-amplification is provided

by a BGW 250D for hf, an IFM amp for mf, and a BGW 750 for lf, while the monitors are also room equalised using White graphics. In addition Marcus also use Tannoy Devon's, Auratones, and in the studio custom JBL's. The studio mics are AKG's plus Neumann U84s, U87s and U89s.

Ancillary equipment available in the control room comprises the usual wide selection. There are Dolby and dbx noise reduction cards powered from a TTM frame which is bypassable. Other units include AMS 15-80 DDL; EMT 240s; Lexicon PrimeTime; Micmix reverb; Eventide Harmonizer; Bel flanger; Marshall Time Modulator; Rebis and Mayer noise gates; UREI and Audio & Design (Recording) comp/limiters; plus various units from Orban.

During my visit Gonzalez were in session and I took the opportunity to ask their opinion of the new studio. The reaction was one of contentment and they seemed especially pleased with the variable acoustic areas. Another point, which Bernie Spratt highlighted was that the size of the studio is such that not only can it happily accommodate orchestral and film recordings, but also due to its size, bands who like to record as though they are on stage find the space and acoustic extremely amenable to this approach.

**Noel Bell**  
 Marcus Music UK, 49-53  
 Kensington Gardens Square,  
 London W2 4BA. Phone: 01-229  
 9595/6/7.

## More digital developments

A recent demonstration at the Centre for Computer Research in Music and Acoustics suggested that the uses of digital technology in the audio field need not be limited to those devices currently being developed by the major manufacturers. Yet the demo also gave weight to the notion that the next decade at least will belong to the A/D hybrid.

A meeting of the NARAS San Francisco chapter was given a brief introduction to A/D conversion by James Moorer, one of several composer/programmers in residence. Then followed some tapes of orchestral instruments 'treated' in the digital domain. A clarinet was dissected and reconstituted from its fundamental twelve partials, complete with breath noises. A piano was created from a sample note for each octave. The parlour tricks dismayed some purists in the audience, one of whom remarked "Too close-miked" after a particularly bizarre cello sound. An interesting point which emerged was that the mathematical model of a complex waveform could be drastically simplified, and thus made cheaper in computer

time, without sacrificing fidelity to the ear. Some convincing A/B comparisons were made.

At this point it became clear that the power of a graphic display programme far surpasses that of more conventional spectrum analysers. Sound can be 'rewritten' with a light pen: the bandwidth of an equaliser can be as precise as a mathematical formula or as idiosyncratic as its author; envelopes and frequency spectra may be selected from 'real' instruments (closemiked or not) or sculpted on the screen. One obvious advantage to the composer is that the sound of his 'instrument', the computer, is as simple or complex as he likes. Unlike analogue synthesizers or the current types of digital tape recorders, one only pays for the computing time one is using, and not for knobs or dynamic range left idle.

Until recently CCRMA has been dependent on the Stanford University Artificial Intelligence Laboratory for computing time. Now equipped with their own computer and a totally digital synthesiser from Systems Concepts of San Francisco, they are capable of realising any sound or effect that

can be programmed. Budget limitations have hitherto kept stereo compositions to a 10kHz bandwidth, but the total control of all other parameters made for some startling signal processing. Research into musical timbre has developed programmes that can cycle a note between four families of instruments, 'crossfading' from one to the next in space and timbre.

In designing a digital reverberation system, Moorer and colleagues examined recordings of impulse (sparkgap) tests in the premier concert halls of the country. An average of their acoustic characteristics was derived from the RT60 recordings and a resulting programme could duplicate those environments, but at a high cost. Again, a drastic simplification in the programme escaped audible detection. A plan for a totally digital studio has attracted no buyers from the recording industry, perhaps because it would cost 2½ to 3½ times as much as a comparable analogue facility, but with micro-processor costs halving every two years that situation may soon be reversed. Current trends in recording indicate that control and repeat-

ability of mechanical functions will be popular updates to existing studios, and some will always pursue the best audio quality available, but it seems that as long as transducers and pressings are the consumers' window on the studio world there will be little demand for the extra specs. On the other hand flexibility and power of software based test equipment has not yet been fully exploited. The *Badap 1* and the Hewlett-Packard *Structural Dynamics Analyser* have immediate applications in audio but both are essentially hardwired devices. It may be that a business or 'personal' computer, some A/D converters and a smart young programmer will be the best investment for studio owners anxious to remain abreast of current trends without committing themselves to a hardware package that may have a limited useful life.

(More detailed explanations of the above scientific investigations are available in the *Journal of the AES* and *An Exploration of Musical Timbre* by John Grey, published by Stanford University, Dept. of Music, Report No. STAN-M-2.)

**Chris Mitchie**



# Expression through equalization.

The MXR Dual-Fifteen Band and Thirty-One Band equalizers are cost effective electronic signal processors designed to meet the most exacting equalization requirements in a wide range of professional applications.

The MXR Dual-Fifteen Band equalizer can be used to tailor the frequency response of two sides of a stereo system, or it can act as two separate mono equalizers. In performance one channel can equalize the house system, while the other is used independently in the stage monitor line adjusting frequency response and minimizing the possibility of feedback. In the studio the Dual-Fifteen Band equalizer can be used to compensate for control room acoustics.

The MXR Thirty-One Band equalizer provides maximum detail in the most demanding equalization applications. It can be used in pairs for ultimate stereo control, or in live performance interfaced with PA systems and other instruments. The Thirty-One Band equalizer is also the perfect tool for conditioning film or video sound tracks, and in mastering applications.

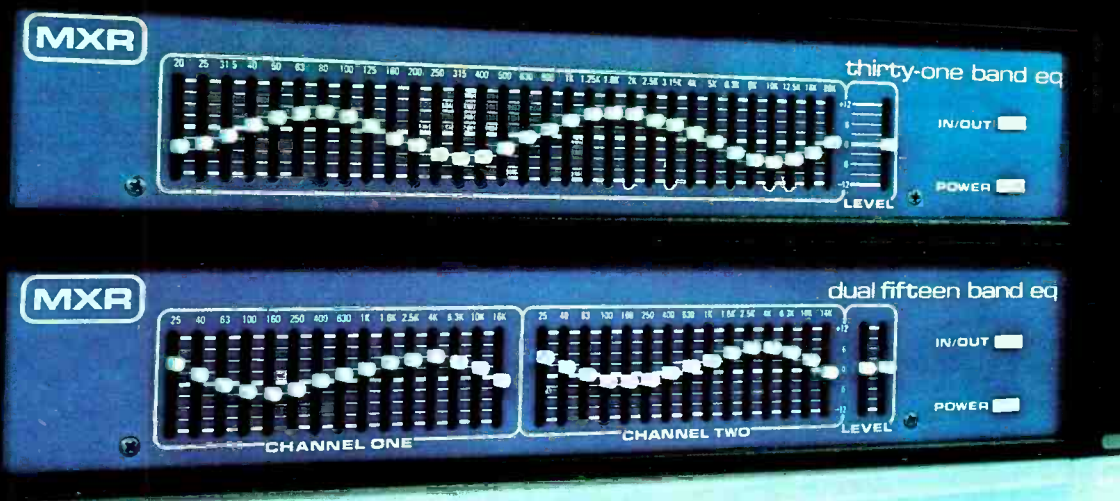
The spacing of frequency bands on ISO centers (2/3 octave in the Dual-Fifteen Band; 1/3 octave in the Thirty-One Band) and a flexible system of controls offer superior accuracy in frequency equalization. Each band can be boosted or cut over a range of  $\pm 12$  dB. Clear, readable markings alongside each level control allow

for quick and accurate checks of equalization settings and aid in resetting the sliders to predetermined positions. The tight mechanical action of the sliders prevents slips during indelicate handling.

The MXR Pro Group equalizers afford maximum control of frequencies while maintaining the highest level of sonic integrity. The Dual-Fifteen and Thirty-One Band equalizers both have a dynamic range exceeding 110 dB and, as all MXR Pro Group products, will drive low impedance lines. Audio signal, including transients, is reproduced faithfully due to a high slew rate and a wide bandwidth.

The MXR Dual-Fifteen and Thirty-One Band equalizers are designed to withstand the demands of a professional road and studio schedule. Their superior design and superb craftsmanship reflect MXR's continuing commitment to the manufacture of the highest quality electronic signal processors for today's creative artists.

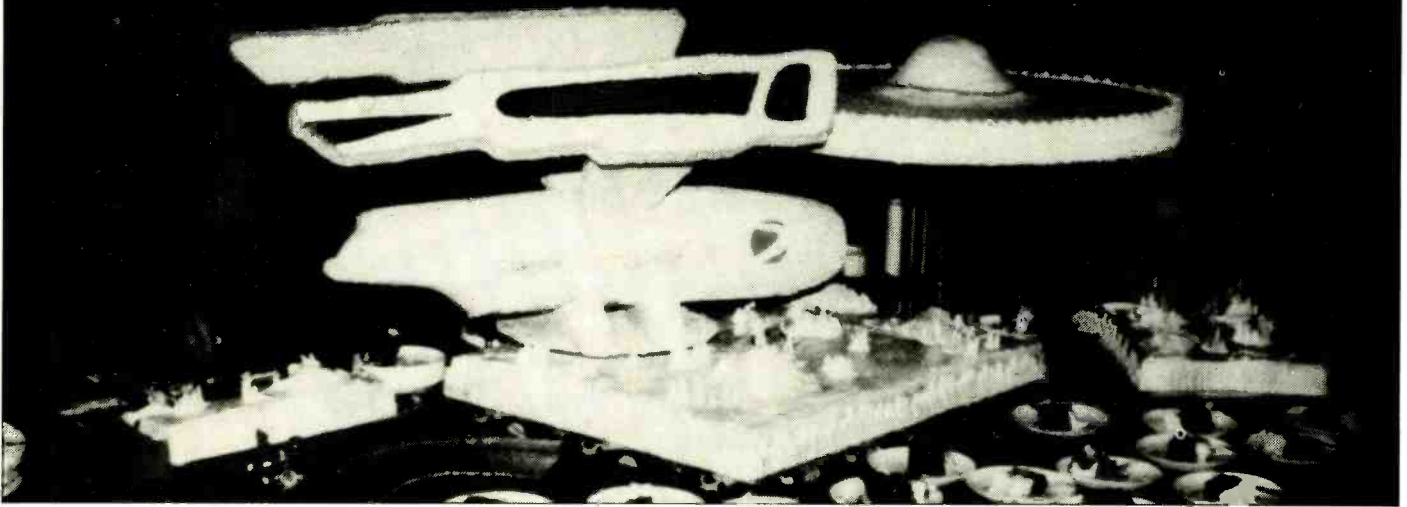
**Atlantex Music, Ltd.**, 34 Bancroft Hitchin, Herts. SG51LA, Eng., Phone 0462 31513, Tlx 826967





# Probing the sounds of Star Trek

Frank Serafine



**I**N 80 YEARS, films have evolved from the earliest silent versions to today's most sophisticated undertakings, and the impact that synthesised sound effects can have on the motion picture industry is obvious. Digital computers and multitrack recording make it possible to create full orchestration and conventional sound effects, as well as hitherto elusive audio sensations to correspond with futuristic visual concepts. These effects enhance a film sequence, increasing that film's audience appeal and credibility.

Film sound to date has mostly been recorded sounds of actual location settings or sound recreated afterwards in post production on foley stages (a facility where movement, clicks, switches, footsteps, etc. are later substituted in the dubbing studio). If you were assigned to do a western movie, that would require a Nagra tape recorder, some cowboys and a few horses galloping; if you were to do a space film, you would be finding yourself at Cape Canaveral recording rockets. In today's modern film sound, the search for sounds that have never been heard before reach out to welcome the warm hand of technology. Moving into the eighties, many producers and directors are beginning to realise the significance of special synthesised sound effects as a viable and cost effective means of producing music and audio effects.

**Sound track production for motion pictures is becoming increasingly complex, with many specially created sounds making-up the final track. Frank Serafine was closely involved with the creation of many synthesised sound effects for *Star Trek, The Motion Picture*.**

Outlining the several areas divided, the sound for *Star Trek, The Motion Picture* was a mammoth undertaking. The first exploration was location dialogue engineered by Tom Overton using Shure SM7 microphones, Nagra 4.2 recorders, and a Stellavox portable mixer at non-Dolby. Much of the dialogue production recording could not be used because of noises inherent to a number of sets due to film projectors and other miscellaneous sound problems to which location sound is prone. The bridge of the *Enterprise* where the majority of the action takes place, was one of these sets. It was crowded with display monitors at the different crew stations. Only 40% of location sound was therefore used, the other 60% of dialogue and foley such as footsteps, switches, clicks, etc. were later re-recorded in post production on the foley stage and edited and mixed later as pre-dubs on the mixing stage. Any adjustments in these soundtracks are later made by the editors. In assistance with dialogue loop editor, Sean Hanley, the voices of actors such as Mr Spock and James Kirk, etc. would then substitute another reading later

in the dubbing studio. The recording of the actors' voices to match the picture was handled in post-production at Paramount Studios through a process called Automatic Dialogue Replacement or ADR. In another common technique of looping, the actor will hear the originally recorded line, then read it for recording, and read it again until the editor thinks it matches. In some instances, the dialogue was to be considered a special sound effect through the processing and alteration done with the EMS *Vocoder*. This technique was used for dramatic purposes.

As all the basic busy work of pre-dubbing (the subgrouping and ping-ponging technique) elements were taking place, the sound editors, supervised by Richard Anderson, Cecelia Hall, George Watters II, Alan Murray, Colin Waddy and Stephen Flick, first had the responsibility of editing and syncing the dialogue and foley to picture, before the actual execution of mixed dubbing, special sound effects and music mixing were to take place. Some of the special acoustically generated, so-called home-brew elements, were generated by the

sound editors themselves using variable speed devices supplied by Glen Glenn Sound at Paramount Studios; sounds such as bee swarms, ripping canvas, mortar fire, etc. As all the sound concepts came together in elements, they were categorised in three divisions A, B, and C effects. The A effects consisted of synthesised and acoustically created major effects — explosions, transporters, warp speeds, V'ger (the mysterious alien entity in the film), energy bolts, etc. The B effects consisted of lesser sounds, such as clicks, switches, beeps, impacts, foley, etc. The C effects were more subliminal — backgrounds, crowd reactions, etc. All these elements were then mixed as predubs for easy handling to follow the sequence of events leading to the final mix.

All the re-recorded sounds for *Star Trek* were mixed at Goldwyn Sound Studios, Stage D, in Hollywood, supervised by Bill Varney, award winner for *Star Wars* and currently *Empire Strikes Back*. Before Varney could get various reels of effects mounted in the machine room for mixing, cue sheets had to be designed by the editors who cut the reels. These indicated which sound was located on which track in relation to the reel of the picture. This standard is common in film mixing to give engineers indications of when and where to make moves on the console. All the elements were to be placed on specific machines to brief the mixers which



tracks were Dolby, non-Dolby stereo and mono formats.

All the homebrew effects turned in by the sound editors were pulled directly from Paramount's Sound Effects Library on 35mm non-Dolby stock, stockpiled since the 1930s. These elements were carefully separated from the current Dolby tracks and synthesised sound effects for the mixer to dial up the correct Dolby and non-Dolby functions. Bill handled all B and C effects accompanied by Steve Maslow on music mixing and Gregg Landaker on A sound effects. These major areas covered first C effects of dialogue and ambience textures, pre-dubbing or ping-ponging to one of three tracks. A and B effects on track two and music on three, then remixed to 4-track (left, right, centre and surround), later to be mixed on 6-track after national release to be shown only in exclusive theatres.

The re-recording equipment in Goldwyn Studios, Stage D, is a Quad-Eight mixer with a Yamaha DM1000 for an extra effects mixer. The major processing systems used were Lexicon digital reverb, Eventide Harmonizer and EMS Vocoder. All of the music and a good percentage of all the effects were recorded dry and in the master dub, processed through Lexicon digital reverb for the depth of field that was required.

The music for *Star Trek* was composed by Jerry Goldsmith, known for many of his great film and TV scores. Jerry recorded his Los Angeles based 90 piece orchestra at 20th Century Fox, Sound Stage 1, known for its excellent natural acoustics. The orchestra was recorded on an API mixing board with three overhead mics, left, centre and right, directly to 35mm magnetic tape, also simultaneously with a 16-track MM1000 as a safe copy. One of the most delicate of our problems on the sound mixing crew was the matching inside and outside from music to sound effects. Often times, music would override the effects and vice versa.

This required either recreating sounds to match the key of the music and extensive use of harmonisers. The sounds that registered in the higher frequencies tended to be the safest place for non-interference. Extensive use of equalisation was handy in the thinning of certain sounds to music interfaces. Some of the special musical sound effects were recorded with the orchestral score by Gregg Hunley on an acoustical beam (something like a railroad tie with large piano strings attached) using transducers, stereo output into advanced audio digital delay systems. This effect added a deep, powerful blast in a few sections of the score.

All the unusually created sound



(l to r) Gregg Landaker, Steve Maslow and Bill Varney mixing effects

effects were generated by the electronic sound team consisting of Al Howarth and myself, creating the majority of the major sequences. Other artists participated in earlier stages of production to complete B and C effects, such as Francisco Lupica, Joel Goldsmith and Dirk Dalton.

Electronic sound synthesis is rapidly replacing acoustic instruments in film work because so many films like *Star Trek* need new sounds to represent the new areas into which man's imagination is venturing. Digital synthesisers and multitrack recording made it possible to create audio sensations to correspond with futuristic visual concepts.

In the early stages of the *Star Trek* film project, many synthesiser artists submitted tapes to Paramount. Most were musical in nature. *Star Trek's* editor, Todd Ramsay, in consultation with director, Robert Wise, felt the picture should have a very unique audio style containing sound effects that would become as characteristic of science fiction in our era as did certain sound effects from past eras of science fiction pictures, such as *2001 A Space Odyssey*, *Forbidden Planet* and *This Island Earth*. One particular concern was to avoid sounds that were over-familiar to current science fiction films. For example, the *Enterprise* mission took place in 2300, therefore we were living in the future. All existing sounds that we may think are futuristic now may not carry over as futuristic in the year 2300. Therefore we were not to cliché typically common sound.

Much time was spent on simple tasks as even the sounds of doors opening and closing. View screens and indicators that would normally make bleeps and clicks were elim-

inated of sound, producing a more comfortable atmosphere for the star fleet to live in. On the other hand, the interior of the Klingon Imperial Cruisers created a much more devastating atmosphere. The Klingon ships' indicators all correspond with matching sounds and tones creating a noisier environment characteristic of the crude living desired by the Klingons.

Another example of uniqueness was that exterior ship travel did not follow the normal routine of low bass rumble. Wise's metaphysical approach stemmed from a more *2001 A Space Odyssey* perspective as opposed to the *Star Wars* genre. The demand for a new type of sound created a search for the leading exponents of the new art of electronics sound creations — a whole new field. Pushing the limits to create sound that had never been heard before, *Star Trek* pioneered the digital age, creating new areas for the sound image composers. The first special assignment was to create the transporter effect (the scene where bodies vanish into light). Due to this sound being one of the most recognisable from the TV series, we were to stay within trekkie boundaries (a mass 10 year following generated by the television series). The old TV transporter was made in the sixties on Farfisa organ peaked through a spring reverb. This sound was researched for several weeks using the Con Brio Digital Synthesiser. This synthesiser is 100% digital and therefore every sound, oscillator, frequency, filter and wave form was to be programmed into the unit before the execution of sound would appear. The ability to analyse all these functions while shaping the exact sound on a computer view screen revolutionised all traditional concepts and ideas developed on

former analogue synthesiser techniques. One of the problems that we encountered with purely digital synthesis was the absence of actual touch sensitivity of the instrument, making it too mechanically precise, lacking the warmth and human quality found in the analogue instruments with their slight imperfections. If you wanted imperfections, you would have to programme them in. It is clear to me that digital synthesis will be the future of synthesised sound due to the enormous amounts of memory storage available. Digital synthesis is still in its very early pioneer stage, with the advent of microprocessors, soon we will see little pocket synthesisers encompassing 24-tracks of digital recording, able to store thousands of sounds and still fit in a briefcase. Other elements were also combined in the making of the transporter. Analogue synthesiser techniques also accompanied the transporter sound, using Roland Jupiter IV Compuphonic synthesiser. This element added a very musical texture to this visual sequence. For the malfunction of the transporter (the sequence which results in the death of two oncoming crewmen) we took the first element of the transporter from the two track mixes and transferred it onto an 8-track tape recorder, ping-ponging the signal onto tracks three through eight, running the signals separately through processing systems such as flangers, harmonisers, a wavemaker, a dual phasing device and a Hawk reverb unit.

For the second element, microphone feedback was generated from an AKG 414 held at a distance of 10 feet in front of a twin reverb guitar amplifier with a Quad-Eight compressor as part of the signal. This sound was played in a bathroom and re-recorded at half speed to produce the aqua-sounding effect.

This began the first initiation of acoustical re-recording. This technique of recording sounds using manipulation of acoustically recorded sounds was most commonly explored by Ben Burt, sound creator for the *Star Wars* films. The characteristics of organic sound sources scope in many directions as creative as synthesised sound, such as the great dog fight scene in *Star Wars*. This sound was created with an elephant roar utilising tape manipulation and processing techniques.

A few examples of these techniques in *Star Trek* were demonstrated in the exterior of the wormhole sequence. This sound was created by taking the sound and reversing the direction of playback, then running it at half speed through a Maxon analogue delay. If you break down the sound of actual blows hitting, there is a moment of impact of air moving, cracking and



## Star Trek



Frank Serafine uses the Prophet 5 for patching and editing sound effects

George Watters and Cecelia Hall edit some film

bashing. In the wormhole, they were being sucked in, and the cowboy fight reversed created a pulling effect. All the interior sounds of the wormhole were recorded by Howarth on a prototype *Prophet 10* directly to 2-track. Al Howarth teamed closely with sound editor Stephen Flick, and mix dubber Bill Varney. This effect was shaped on the dubbing stage, processed with Eventide *Harmonizer* to create a frantically whirlwind sensation. Another example of acoustical re-recording was in the V'ger sequence, when the voice replies to Captain Kirk. This sound was created using percussive mallets, beating on the inside of an acoustic grand piano, later mixed on to 24 tracks by Joel Goldsmith using a Lexicon digital reverb for vast sounding dimensions.

*Star Trek* was a very good example of the blending of acoustical re-recorded sounds with the tasteful variety of synthesised sounds. Most of the electronic effects for *Star Trek* were recorded on a Teac 80-8 with dbx, using Ampex 456 *Grand Master* tape. Recording consoles used were modified Teac 5-A and Wave-maker's 858-A. At first the sound team resisted, thinking that they needed 24 tracks. It turned out that eight was enough for creating effects. For the handling of musical recording, it is essential to have 24 tracks; for the creating of sound effects, eight is enough.

This technique of dividing effects up in elements gave the director accessibility and versatility of just what he wanted to hear or not hear in the sequence as opposed to 24-track recording where you would tend to make a completed mix of all the elements, therefore if there were changes to be made, this would mean a complete remix of the effect.

This developed the mentality of the grouping of elements. Grouping sound effects is important in many instances; in this case the director would hear sounds and concepts but

could not clearly explain them, seeing that there is no sound that exists on earth to represent these areas, all sound that was made was broken down into several elements to separate the variety of textures making the completed sound. In most cases, to communicate the overall concept in mind, a full mixed composite track was made along with the units. This was given to the editors so they would have a basic concept of what was being attempted as a whole. For instance, in the digitalisation of the Klingon cruisers and Epsilon 9 Monitoring Station, this was 40 elements made up of various synthesiser tracks done on 8-track. Certain textures would correspond with certain characteristics visually. For instance, high wind down, low digitalisation, digital teeth, harmonised rain. These were all names that corresponded the sound to picture. Every element was to have a name.

The *Prophet 5* synthesiser was the main one used in *Star Trek* and was most perfectly suited to our needs. The *Prophet* marries the analogue synthesiser with a digital memory computer. Many synthesisers had been explored in the early stages, huge modular systems with lots of patchwork. Many variables were derived but the problems of patching systems is that they are not quick enough, along with being monophonic — the *Prophet* is polyphonic. Another problem inherent to patching systems is the absence of computer memory. Many hours went into creating these sounds upon finding that they may have to be changed the next day. The *Prophet 5* provided all these memorised sounds instantly upon recall and the ability to edit at any given point. 40 different programmes can be stored into the system's memory, in addition all the programming for the *Prophet* is internally routed, no mechanical patching is used. This was particularly handy in many instances considering the intense deadline scheduled, the visual effects hadn't started arriving till

very near to our final release date. We developed several sound concepts, sight unseen to the visuals, for several months.

Occasionally visiting John Dykstra's and Douglas Trumbull's place (the visual effects creators for the film) we would catch glimpses of these ongoing and ever changing visual effects. A lot of what we saw down there was completely different when we actually got it, so at the last minute, we had to scramble. Digital memory allowed the versatility and alteration of all the pre-picture concepts. As opposed to having to start from scratch, most commonly characteristic in the mechanical patching of analogue synthesisers.

I was faced with choosing a sound to signify the warp acceleration light barrier, the scene where the *Enterprise* shot across the screen into warp speed. Using the *Prophet 5*, Roland *Jupiter IV* and Moog synthesisers, I started sculpting my basic ideas. I then took the sound that was recorded on to track 1 and began to process with flanging and delay, etc. dropping those sounds onto tracks 2, 3, 4, etc. Therefore track 1 was a skeleton track to which I could add more meat. The chosen processed signals were broken down in as many elements as correspond to the colours in the stretching tail of light. The sound used for the backlash of the warp acceleration stretch was another example of non-acoustic recording. Using a cymbal crash turned backwards at half speed created a stretching rubber band effect. This sound was cut to total perfection by editor Alan Murray.

Probably the most ominous sound created in *Star Trek* was ending the film in a celebration of light upon Ilia and Decker entering into the vast cosmos. This mind melt sequence was a total of 360 tracks. Along with co-creator and engineer, Miki Curtis, renowned Japanese producer, we worked long stretched hours to complete this final sequence. The original tracks were recorded with the *Prophet* and

Moog synthesisers on an 8-track recorder. These multitudes of ideas and concepts were then all mixed down to two tracks as a submix. All these 2-track submixes were then again transferred back to 8-track, finally mixed down into 22 different elements, handed to the dubbers and combined to create the 360-track final mix.

One of the most technical problems we encountered was the transferring process from 1/4in tape to 35mm magnetic tape. Being Dolby, we recorded everything with the Dolby level, only to find later the best process was to mix all sounds down non-Dolby. The Dolby was then later added to the 35mm magnetic from the 1/4in tape in the transfer. Other techniques of eliminating noise in the process of recording was to spontaneously program several synthesisers at the same time recording all elements directly live onto 2-track. Another process we used was recording synthesisers live on the dubbing stage directly to 35mm magnetic.

The idea of *Star Trek* from its very roots stems from a highly technical civilisation. The nature of the script itself attracted high technology behind the scenes as a reflection of what the film was conveying. Pioneering the digital age in the film, video and audio worlds, many new advancements have been discovered to help towards the marriage of efficient audio visual interlocking systems. The introduction of audio and video timecode synchronising systems allows for a much more efficient way of composing sound effects and music directly to the picture, eliminating and bypassing cost effective and traditional approaches. One synthesist will be able to create a musical score, sound effects, and all dialogue special effects with sufficient ease. Not to mention the versatility involved in and demonstrated by the new development presented by the Roland Corporation at the last AES Convention in Los Angeles in June. This computer editor is a fully automated system, also being a master clock for digital sequencing storage as well as audio to video time coding interface. All these tools offered within the last few months will allow tremendous flexibility in films to come.

Clearly the industry has come a long way from the early silent era. Now beyond simple story telling, we are in an age of film that is a sensory experience, so much so that when we go to see the likes of *Star Trek* and *Star Wars*, we leave the theatres having a profound change in our lives. Synthesised sound is becoming a major part of creating the plausibility of these future films. The technology available today has given us a jump in our level of consciousness — that is the purpose of media. ■



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# Survey: Amplifiers

Precisely what constitutes a power amplifier is possibly open to discussion, so in this survey we have included professional models for both monitoring and PA applications, and a few 'hi fi' types which might overlap into these applications. Many 'hi fi' amplifiers have however been deliberately omitted.

## AB SYSTEMS (USA)

AB System Design Inc, PO Box 754, Folsom, Cal 95630, USA.  
Phone: (916) 988-8551.

### 105

**Type:** two channels, may be bridged.  
**Power output:** 50W/channel into 8 $\Omega$ , 75W/channel into 4 $\Omega$ .  
**Total distortion:** 0.15% 20Hz to 20kHz.  
**Noise:** unweighted 104dB below rated output.  
**Full power bandwidth:** 20Hz to 20kHz  $\pm$ 0.25dB.  
**Price:** \$399.

### 205/410

**Type:** two channels.  
**Power output:** 205 100W/channel into 8 $\Omega$ , 200W/channel into 4 $\Omega$ ; 410 205W/channel into 8 $\Omega$ , 410W bridged into 16 $\Omega$ , 325W/channel into 4 $\Omega$ .  
**Total distortion:** 0.1% 20Hz to 15kHz.  
**Noise:** -101dB referred to rated output.  
**Full power bandwidth:** 20Hz to 20kHz  $\pm$ 0.25dB.  
**Price:** 205 \$599, 410 \$949.

### 740

**Channels:** four.  
**Power output:** 100W/channel into 8 $\Omega$ , 150W/channel into 4 $\Omega$ .  
**Price:** \$995.

### 710/720

**Type:** 710 mono biamp, 720 two channel bi amp.  
**Power output:** 710 lo freq channel 350W into 8 $\Omega$ , hi freq 100W; 720 100W/channel into 8 $\Omega$ , 150W/channel into 4 $\Omega$  lo freq, 50W/channel into 8 $\Omega$ , 75W/channel into 4 $\Omega$  hi freq.  
**Total distortion:** 0.25%  
**Noise:** -100dB.  
**Full power bandwidth:** 20Hz to 20kHz  $\pm$ 0.25dB. Includes crossover cards 800Hz/12dB.  
**Price:** 710 \$799, 720 \$1,039.

### 730

Similar to 730 but triamp with 350W into 8 $\Omega$  bridged bass, 100W into 8 $\Omega$  mid, 50W into 8 $\Omega$  hi freq. Includes 800Hz/12dB and 7kHz/12dB crossover cards.  
**Price:** \$1,059.

## ACCUPHASE (Japan)

Kensonic Laboratory Inc, 2-14-10 Shin-Isikawa Midori-Ku, Yokohama 227, Japan.  
Phone: 045 901-2771. Telex: 3823780.  
**Europe:** PIA Hifi Vertriebs GmbH, Ludwigstrasse 4, D-6082 Morfelden-Walldorf, West Germany.  
Phone: 06105 76995. Telex: 4185785.  
**USA:** Teac Corp of America, 7733 Telegraph Road, Montebello, Cal 90640.  
Phone: (213) 726-0303.

### M60

**Type:** single channel.  
**Power output:** 150W into 16 $\Omega$ , 300W into 8 $\Omega$ , 450W into 4 $\Omega$ .  
**Total distortion:** 0.03% 20Hz to 20kHz.  
**Noise:** 115dB below rated output.

**Full power bandwidth:** 20Hz to 20kHz -0.2dB.  
**Price:** on application.

### P260

**Type:** two channels MOS FET output stage, Class A with reduced power.  
**Power output:** 65W/channel into 16 $\Omega$ , 130W/channel into 8 $\Omega$ , 180W/channel into 4 $\Omega$ .  
**Total distortion:** 0.01%  
**Noise:** 120dB below rated output.  
**Full power bandwidth:** 20Hz to 20kHz -0.2dB.  
**Price:** on application.

### P400

Similar to P260, but 100W/channel into 16 $\Omega$ , 200W/channel into 8 $\Omega$ , 300W/channel into 4 $\Omega$ .  
**Price:** on application.

## AC-ES (UK)

A.C. Electronic Services, Broad Oak, Albrighton, Nr. Shrewsbury, Shropshire SY4 3AG, UK.  
Phone: 0939 290574

### ACSP150/300/600

**Type:** ACSP150 single channel, ACSP300 and 600 dual.  
**Power output:** ACSP150 and 300, 150W/channel into 4 $\Omega$ , 100W/channel into 8 $\Omega$ ; ACSP600 300W/channel into 4 $\Omega$ .  
**Total distortion:** 0.09% at rated output.  
**Noise:** 95dB below rated output.  
**Full power bandwidth:** 15Hz to 25kHz  $\pm$ 3dB.  
**Price:** ACSP150 £104.54, ACSP300 £173.44, ACSP600 £234.38

### ACSP1000

Similar to above, but dual channel 170W/channel into 8 $\Omega$ , 300W/channel into 4 $\Omega$ , 480W/channel into 2 $\Omega$ .  
**Price:** £346.87.

## ADVANCED TECHNOLOGY DESIGN (USA)

Advanced Technology Design Corp, PO Box 27096, Los Angeles, Cal 90027, USA.  
Phone: (213) 661-4733/761-8656.

### 221/421/821

**Type:** single channel, built-in lo-pass filters selectable at 50 or 80Hz with 18dB/octave, selectable hi-pass at 20Hz, 421 and 821 have variable vlf eq.  
**Power:** 221 150W into 8 $\Omega$ , 421 400W into 8 $\Omega$ , 821 800W into 8 $\Omega$ .  
**Total distortion:** 0.1%  
**Noise:** 221 -104dB, 421 and 821 -101dB.  
**Full power bandwidth:** 20Hz to 209kHz  $\pm$ 0.25dB.  
**Price:** 221 \$420, 421 \$720, 821 \$1,090.

### 222/422/722

Basically similar to above, but two channels with power outputs 222 50W channel into 8 $\Omega$ , 75W/channel into 4 $\Omega$ ; 422 100W/channel into 8 $\Omega$ , 200W/channel into 4 $\Omega$ ; 722 200W/channel into 8 $\Omega$ , 350W/channel into 4 $\Omega$ .  
**Price:** 222 \$460, 422 \$750, 722 \$1,090.

### 344/644

Basically similar to above, but four channel with power

outputs 344 50W/channel into 8 $\Omega$ , 75W/channel into 4 $\Omega$ ; 644 100W/channel into 8 $\Omega$ , 150W/channel into 4 $\Omega$ .

**Price:** 344 \$870, 644 \$1,090.

### 512/712/524

**Type:** biampers with dividing networks, hi-pass filters, lo eq, and hi driver compensation. 512 and 712 are single channel biamps, 524 is two channel biamp.  
**Power:** 512 lf 350W into 8 $\Omega$ , hf 100W into 8 $\Omega$ ; 712 lf 450W into 4 $\Omega$ , 300W into 8 $\Omega$ , hf 150W into 4 $\Omega$ , 100W into 8 $\Omega$ ; 524 lf 150W/channel into 4 $\Omega$ , 100W/channel into 8 $\Omega$ , hf 75W/channel into 4 $\Omega$ , 50W/channel into 8 $\Omega$ .  
**Total distortion:** 0.25%  
**Noise:** -101dB.  
**Full power bandwidth:** 20Hz to 20kHz  $\pm$ 0.25dB.  
**Price:** 512 \$940, 712 \$1,090, 524 \$1,180.

### 513/713

**Type:** triampers with dividing networks, hi pass filters, lo eq, and hi driver comp, single channel.  
**Power:** 513 lf 350W into 8 $\Omega$ , mid 100W into 8 $\Omega$ , hf 50W into 8 $\Omega$ ; 713 lf 450W into 4 $\Omega$ , 300W into 8 $\Omega$ , mid 150W into 4 $\Omega$ , 100W into 8 $\Omega$ , hf 150W into 4 $\Omega$ , 100W into 8 $\Omega$ .  
**Total distortion:** 0.1%  
**Noise:** -101dB.  
**Full power bandwidth:** 20Hz to 20kHz  $\pm$ 0.25dB.  
**Price:** 513 \$1,180, 713 \$1,290.

### 7132

Basically similar in power output to 712 above, but three output biamp, with single lf output, but two hf amps.  
**Price:** \$1,290.

## ALTEC LANSING (USA)

Altec Corp, 1515 South Manchester Avenue, Anaheim, Cal 92803, USA.  
Phone: (714) 774-2900.  
**UK:** Theatre Projects Services Ltd, 10 Long Acre, London WC2E 9LN.  
Phone: 01-240 5411. Telex: 27522.

### 9440A

**Type:** two channel, VU meters, bridgable.  
**Power:** both channels driven 200W/channel into 8 $\Omega$ , 400W/channel into 4 $\Omega$  bridged for mono 800W into 8 $\Omega$ .  
**Total distortion:** 0.25% both channels driven.  
**Noise:** 100dB.  
**Full power bandwidth:** 20Hz to 20kHz  $\pm$ 0.25dB.  
**Price:** £679.

## Incremental Power System 2200

**Type:** rack mounted frame that accepts up to eight 75W or four 150W power amplifiers, an electronic crossover, bal or unbal input card, and special driver amps with matrix switching for console like signal processing. May be used in parallel mode to drive high power low imp loads, in bal mode will drive bal 70V lines.  
**Power:** 2275 modules 75W into 16 $\Omega$ , may be paralleled up to 600W, 2276 modules 150W into 8 $\Omega$ , may be paralleled up to 600W.  
**Total distortion:** 0.25% 20Hz to 15kHz.



Noise: -96dB.  
Full power bandwidth: 20Hz to 20kHz -0.5dB.  
Price: on application.

#### AUDIONICS (USA)

Audionics of Oregon, Suite 160, 10950 SW 5th Avenue, Beaverton, Oregon 97005, USA.  
Phone: (503) 641-5225, Telex: 910-467 8728.

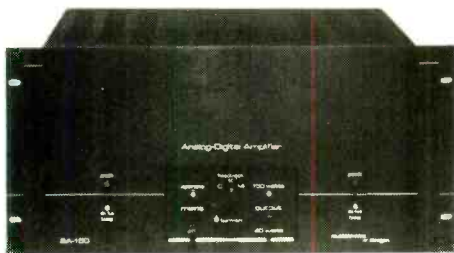
#### BA150

Type: hybrid two channel amplifier using solid state intermediate stages, but class B valve (tube) output stages with logic auto biasing control circuitry, two channel.

Power output: 150W/channel into 4, 8 or 16 $\Omega$ .  
Total distortion: 3% with 0dB negative feedback, 0.5% with 14dB feedback.  
Noise: not stated.  
Full power bandwidth: 5Hz to 25kHz  $\pm$ 2dB with 0dB feedback.  
Price: \$3,250.

#### CC2

Type: two channel, bridgable mono.  
Power: 70W/channel into 8 $\Omega$ , 120W/channel into 4 $\Omega$ , 225W into 8 $\Omega$  bridged.  
Total distortion: 0.18%.  
Noise: not stated.  
Full power bandwidth: 20Hz to 20kHz  $\pm$ 0.5dB.  
Price: \$549.



#### BOGEN/TECHCRAFT (USA)

Bogen Division, Lear Sieger Inc, PO Box 500, Paramus, New Jersey 07652, USA.  
Phone: (201) 343-5700.

#### TCB-60/125/250

Type: single channel with transformer outputs which may be matched into 25, 50, 70 and 16V (4 $\Omega$ ) bal or 40, 65 and 90V unbal.  
Power: TCB-60 65W into 4 $\Omega$ , TCB-125 135W into 2 $\Omega$ , TCB-250 275W into 1 $\Omega$ .  
Total distortion: 1% 20Hz to 22kHz.  
Noise: 86dB.  
Full power bandwidth: 20Hz to 20kHz  $\pm$ 1dB.  
Price: TCB-60 \$450, TCB-125 \$547.50, TCB-250 \$750.

#### TCB-S160/320

Type: dual channel.  
Power: TCB-S160 80W/channel into 8 $\Omega$ , 160W/channel into 16 $\Omega$ , TCB-S320 160W/channel into 8 $\Omega$ , 320W/channel into 16 $\Omega$ .  
Total distortion: 0.1% from 10Hz to 20kHz.  
Noise: -95dB.  
Full power bandwidth: 10Hz to 20kHz  $\pm$ 0.2dB.  
Price: TCB-S160 \$637.50, TCB-S320 \$862.50.

#### MT-60A/125B/250

Type: single channel, transformer output with various voltage outputs.  
Power: MT-60A 60W into 2.8 $\Omega$ , MT-125B 125W into 1.4 $\Omega$ , MT-250 250W into 0.8 $\Omega$ .  
Total distortion: 2% 50Hz to 15kHz.

Noise: -85dB.  
Full power bandwidth: 20Hz to 20kHz  $\pm$ 2dB.  
Price: MT-60A \$237.20, MT-125B \$304.50, MT-250 \$589.20.

#### BGW (USA)

BGW Systems Inc, 13130 South Yukon Avenue, Hawthorne, Cal 90250, USA.  
Phone: (213) 973-8090. Telex: 664494.  
UK: Court Acoustics Ltd, 35-39 Britannia Row, London N1 8QH.  
Phone: 01-359 0956. Telex: 268279.

#### 50A/100A

Type: two channel, bridgable.  
Power: 50A 25W/channel into 8 $\Omega$ , mono 50W into 8 $\Omega$ , 100B 60W/channel into 4 $\Omega$ .  
Total distortion: 50A 0.05%, 100B 0.1%.  
Noise: 50A -102dB, 100B -106dB.  
Full power bandwidth: 20Hz to 20kHz -0.25dB.  
Price: 50A £191.40, 100B £254.10.

#### 250/300/320/600/620/750

Type: two channel, 250D and 750C have clipping indicators, 250E and 750B have LED level meters, 300 and 600 are basic, 320 and 620 have line output transformers for matching most impedances and lines.  
Power: 250/300/320 100W/channel into 8 $\Omega$ , 126W/channel into 4 $\Omega$ , mono 251W into 8 $\Omega$ ; 600/620 175W/channel into 8 $\Omega$ , 250W/channel into 4 $\Omega$ ; 750 225W/channel into 8 $\Omega$ , 360W/channel into 4 $\Omega$ .  
Distortion: 0.1% 20Hz to 20kHz.  
Noise: -110dB.  
Full power bandwidth: 20Hz to 20kHz -0.25dB.  
Price: 250D £387.20, 250E £447.70, 300 £328.51, 320 £399.80, 600 £498.61, 620 £564.33, 750C £641.30, 750B £707.85.

#### 1250

Type: two channel, LED level meters, line transformers.  
Power: 400W/channel into 8 $\Omega$ , 600W/channel into 4 $\Omega$ , mono 1,200W into 8 $\Omega$ .  
Total distortion: 0.03%.  
Noise: -115dB.  
Full power bandwidth: 20Hz to 20kHz -0.25dB.  
Price: £986.

#### BIAMP (USA)

Biamp Systems Inc, 9600 SW Barnes Road, Portland, Oregon 97225, USA.  
Phone: (503) 297-1555.

#### TC60/120/225

Type: two channels, bridgable.  
Power: TC60 60W/channel into 8 $\Omega$ , 100W/channel into 4 $\Omega$ ; TC120 120W/channel into 8 $\Omega$ , 190W/channel into 4 $\Omega$ ; TC225 225W/channel into 8 $\Omega$ , 350W/channel into 4 $\Omega$ .  
Total distortion: 0.08%.  
Noise: -105dB.  
Power bandwidth: 1Hz to 20kHz  $\pm$ 0.15dB @ 1W 8 $\Omega$ .  
Price: TC60 \$445, TC120 \$565, TC225 \$890.

#### BOSE (USA)

Bose Corp, The Mountain, Framingham, Mass 01701, USA.  
Phone: (617) 879-7330.  
UK: Bose (UK) Ltd, Sittingbourne Industrial Park, Crown Quay Lane, Sittingbourne, Kent.  
Phone: 0795 75341. Telex: 965559.

#### Model 1800

Type: two channel, LED level indication.  
Power: 250W/channel into 8 $\Omega$ , 400W/channel into 4 $\Omega$ .  
Total distortion: 0.5% 20Hz to 10kHz.  
Noise: -100dB.  
Full power bandwidth: 10Hz to 20kHz  $\pm$ 1dB.  
Price: on application.

#### BOZAK (USA)

Bozak Inc, PO Box 1166, Darien, Conn 06820, USA.  
Phone: (203) 838-6521.

#### CMA-2-65/1-80/2-80/1-120/2-150

Type: 1- is single channel, 2- dual channel.  
Power: 2-65 65W/channel into 8 $\Omega$ , 1-80 80W into 8 $\Omega$ , 2-80 80W/channel into 8 $\Omega$ , 1-120 120W into 8 $\Omega$ , 2-150 150W/channel into 8 $\Omega$ .  
Total Distortion: 0.2% 20Hz to 20kHz.  
Noise: 90dB.  
Full Power Bandwidth: 20Hz to 20kHz -1dB.  
Prices: 1-80 \$575, 2-80 \$740, 2-65 \$575, 1-120 \$595, 2-150 \$850.

#### BRYSTON (Canada)

Bryston Mfg Ltd, 57A Westmore Drive, Rexdale, Ontario, M9V 3Y6, Canada.  
Phone: (416) 746-1800.  
UK: KJ Leisuresound Ltd, Bridle Path, Watford, Herts, WD2 4BZ.  
Phone: 0923 33011.

#### 2B/3B/4B

Type: two channels, bridgable.  
Power: 2B 50W/channel into 8 $\Omega$ , 100W/channel into 4 $\Omega$ ; 3B 100W/channel into 8 $\Omega$ , 200W/channel into 4 $\Omega$ ; 4B 200W/channel into 8 $\Omega$ , 400W/channel into 4 $\Omega$ .  
Total Distortion: 0.05% 20Hz to 20kHz.  
Noise: -100dB.  
Full power bandwidth: 1Hz to 100kHz.  
Price: 2B £260, 3B £347, 4B £521.

#### CARLSBRO (UK)

Carlsbro Sales Ltd, Cross Drive, Lowmoor Road Ind Est, Kirkby-in-Ashfield, Notts, UK.  
Phone: 0623 753902. Telex: 377472.

#### S800

Type: two channel, bridgable.  
Power: 200W/channel into 8 $\Omega$ , 300W/channel into 4 $\Omega$ , 400W/channel into 2.6 $\Omega$ .  
Total distortion: above figures with clipping set at 5%.  
Noise: -100dB.  
Full power bandwidth: 20Hz to 20kHz -1dB.  
Price: on application.

#### CREST (USA)

Crest Audio Inc, 9171 Gazette Avenue, Chatsworth, Cal 91311, USA.  
Phone: (213) 998-3120.  
UK: Martin Audio Ltd, 54-56 Stanhope Street, London NW1 3EX.  
Phone: 01-388 7162.

#### P-1500/2500/3500/2501/3501

Type: two channel, peak LEDs on 2501/3501, LED level indication 2500/3500.  
Power: P-1500 60W/channel into 8 $\Omega$ , 90W/channel into 4 $\Omega$ ; 2500 125W/channel into 8 $\Omega$ , 200W/channel into 4 $\Omega$ ; 3500 250W/channel into 8 $\Omega$ , 400W/channel into 4 $\Omega$ .  
Distortion: 0.1% at clip.  
Noise: -100dB.  
Full power bandwidth: 20Hz to 20kHz -0.2dB.  
Price: P-2500 £475, P-2501 £433, P-3500 £669, P-3501 £623.

#### CROWN/AMCRON (USA)

Crown International Inc, 1718 West Mishawaka Road, Elkhart, Indiana 46514, USA.  
Phone: (219) 294-5571. Telex: 810-294-2160.  
UK: HHB, Unit F, New Crescent Works, Nicoll Road, London NW10 9AX.  
Phone: 01-961 3295. Telex: 923393.

#### DC75/150A/300A

Type: two channel, overload and signal presence LEDs, bridgable.  
Power: D75 35W/channel into 8 $\Omega$ , 45W/channel into 4 $\Omega$ ; D150A 80W/channel into 8 $\Omega$ , 125W/channel into 4 $\Omega$ ; DC300A 155W/channel into 8 $\Omega$ , 250W/channel into 4 $\Omega$ .

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## Survey

**Total distortion:** 0.05% to rated output.  
**Noise:** -110dB.  
**Full power bandwidth:** dc to 20kHz  $\pm$ 0.1dB.  
**Price:** DC75 £260, DC150A £390, DC300A £595.

### PSA2

**Type:** two channel, hi and lo pass filters, test tone generator, adjustable compressor.  
**Power:** 220W/channel into 8 $\Omega$ , 400W/channel into 4 $\Omega$ , 685W/channel into 2 $\Omega$ , bridging mono 1,370W into 4 $\Omega$ .  
**Total distortion:** 0.05% to rated output.  
**Noise:** -115dB.  
**Full power bandwidth:** dc to 20kHz  $\pm$ 1dB.  
**Price:** £895 with bal input module, £850 less bal, £1,080 with LED display.

### M600/2000

Basically similar to DC300A but single channel with rather higher power, VU meter on front panel. M600 600W into 8 $\Omega$ , 1kW into 4 $\Omega$ ; M2000 (two M600 bridged) 2kW into 8 $\Omega$ ; 1kW into 16 $\Omega$ .  
**Price:** on application.

### CUSTOM SOUND (UK)

Custom Sound Solid State Technology Ltd, Custom House, Arthur Street, Oswestry, Salop SY11 1JN, UK.  
**Phone:** 0691 59201.

### PPA1/2

**Type:** two channel, bridgable, VU meters.  
**Power:** PPA1 150W/channel into 8 $\Omega$ , 300W/channel into 4 $\Omega$ , 500W/channel into 2 $\Omega$ ; PPA2 100W/channel into 8 $\Omega$ , 150W/channel into 4 $\Omega$ , 100W/channel into 2 $\Omega$ .  
**Total distortion:** 0.1%.  
**Noise:** -96dB.  
**Full power bandwidth:** 20Hz to 25kHz  $\pm$ 3dB.  
**Price:** on application.

### DB (USA)

DB Systems, PO Box 187, Jaffrey Center, New Hampshire 03454, USA.  
**Phone:** (603) 899-5121.

### DB-6/6M

**Type:** two channel and single channel (6M).  
**Power:** 40W/channel into 8 $\Omega$ , 60W/channel into 4 $\Omega$ , 6M 140W into 8 $\Omega$ , 225W into 4 $\Omega$ .  
**Total distortion:** 0.01%.  
**Noise:** -96dB.  
**Full power bandwidth:** 20Hz to 40kHz -1dB.  
**Price:** on application.

### DYNACORD (West Germany)

Dynacord Electronics GmbH, PO Box 68, D-8440, Strubing, West Germany.  
**Phone:** 09421 3101.  
UK: Beyer Dynamic (GB) Ltd, 1 Clair Road, Haywards Heath, Sussex.  
**Phone:** 0444 51003.  
USA: Dynacord Electronics Inc, PO Box 26038, Philadelphia, Penn 19128. **Phone:** (215) 482-4992.

### A1001/2002

**Type:** two channels, LED level indication, bridgable.  
**Power:** A1001 80W/channel into 8 $\Omega$ , 120W/channel into 4 $\Omega$ ; A2002 170W/channel into 8 $\Omega$ , 250W/channel into 4 $\Omega$ .  
**Total distortion:** 0.2%.  
**Noise:** 90dB.  
**Prices:** on application.

### AX303

**Type:** three channel with electronic crossover, LED level indication, adjustable crossover frequencies.  
**Power:** If 170W into 8 $\Omega$ , 250W into 4 $\Omega$ , mid and hf 75W into 8 $\Omega$ , 100W into 4 $\Omega$ .  
**Total distortion:** 0.2%.  
**Noise:** 90dB.  
**Price:** on application.

### EXPOSURE (UK)

Exposure Electronics, Richardson Road, Hove, Sussex, UK.  
**Phone:** 0273 777912.

### Exposure IV

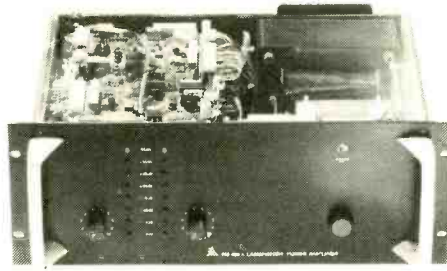
**Type:** two channel.  
**Power:** 75W/channel into 8 $\Omega$ , 200W/channel into 4 $\Omega$ .  
**Total distortion:** 0.01%.  
**Noise:** not stated.  
**Full power bandwidth:** 10Hz to 20kHz,  $\pm$ 1dB.  
**Price:** single power supply version £300, separate supply for each channel version £450.

### FM ACOUSTICS (Switzerland)

FM Acoustics Ltd, Tiefenhofstrasse 17, CH-8820 Wädenswil, Switzerland.  
**Phone:** 01 780.64.44. **Telex:** 56058 attn FMA.  
UK: FM Acoustics UK, 2 Kempston Road, Weymouth, Dorset DT4 8XT.  
**Phone:** 0305 784049.  
USA: Win Laboratories, PO Box 332, Goleta, Cal 93017.  
**Phone:** (805) 968-8741.

### FM600A/800A

**Type:** two channel, LED overload indicators.  
**Power:** FM600A 300W/channel into 8 $\Omega$ , 350W/channel into 4 $\Omega$ , 400W/channel into 2 $\Omega$  (special version); FM800A 400W/channel into 8 $\Omega$ , 600W/channel into 4 $\Omega$ , 850W/channel into 2 $\Omega$ .  
**Total distortion:** 0.008% at mid, 'somewhat higher at very low and very high frequencies'.  
**Noise:** -105dB.  
**Full power bandwidth:** 5Hz to 300kHz -3dB at 50W.  
**Prices:** on application.



### HARMAN/KARDON (USA)

Harman/Kardon, 55 Ames Court, Plainview, NY 11803, USA.  
UK: Harman (Audio) UK Ltd, St John's Road, Tylers Green, High Wycombe, Bucks HP10 8HR.  
**Phone:** 049481 5221. **Telex:** 8371116.

### Citation 19/16

**Type:** two channel power amplifiers, LED level indication.  
**Power:** Citation 19 100W/channel into 8 $\Omega$ , Citation 16 150W/channel into 8 $\Omega$ .  
**Total distortion:** -100dB.  
**Full power bandwidth:** 5Hz to 45kHz  $\pm$ 0.5dB.  
**Price:** on application.

### HEIL SOUND (USA)

Heil Sound, No 2 Heil Industrial Drive, Marissa, Illinois 62257, USA.  
**Phone:** (618) 295-3000.

### Pro-series 200/400

**Type:** two channel.  
**Power:** 200 150W/channel into 4 $\Omega$ , 400 250W/channel into 4 $\Omega$ .  
**Total distortion:** 0.09%.  
**Full power bandwidth:** 20Hz to 20kHz.  
**Price:** on application.

### HH (UK)

HH Electronic, Viking Way, Bar Hill, Cambridge, CB3 8EL, UK.  
**Phone:** 0954 81140. **Telex:** 817515.

### S500-D

**Type:** two channel, bridgable.  
**Power:** 210W/channel into 8 $\Omega$ , 340W/channel into 4 $\Omega$ , max 500W/channel into 2.5 $\Omega$ .  
**Total distortion:** 0.02%.  
**Noise:** -100dB.  
**Power bandwidth:** dc to 20kHz -1dB.  
**Price:** £450.28.

### V150L/200/500/800

**Type:** V150L single channel, others two channels. MOS FET outputs, peak LEDs. V800 has LED level indication.  
**Power:** V150L 105W into 8 $\Omega$ , 150W into 4 $\Omega$ ; V200 65W/channel into 8 $\Omega$ , 100W/channel into 4 $\Omega$ ; V500 150W/channel into 8 $\Omega$ , 250W/channel into 4 $\Omega$ ; V800 260W/channel into 8 $\Omega$ , 400W/channel into 4 $\Omega$ .  
**Total distortion:** 0.02%.  
**Noise:** -100dB.  
**Full power bandwidth:** 10Hz to 50kHz -1dB.  
**Price:** V150L £238.70. V200 £299.15. V500 £419.28. V800 £528.55.

### AM8/12, TPA25D/50D/100D

**Type:** single channel, AM8/12 is BBC version of TPA25D.  
**Power:** TPA25D 45W into 8 $\Omega$ , 75W into 4 $\Omega$ ; TPA50D 75W into 8 $\Omega$ , 100W into 4 $\Omega$ ; TPA100D 180W into 8 $\Omega$ , 240W into 4 $\Omega$ .  
**Total distortion:** 0.1%.  
**Noise:** -100dB.  
**Full power bandwidth:** 20Hz to 20kHz  $\pm$ 0.2dB.  
**Price:** on application.



### HILL (UK)

Malcolm Hill Associates, Hollingbourne House, Hollingbourne, Kent, UK.  
**Phone:** 062780 556.

### DX 140/200/350/500/700

**Type:** two channel, optional VU meter.  
**Power:** DX140 80W/channel into 8 $\Omega$ , 105W/channel into 4 $\Omega$ ; DX200 175W/channel into 8 $\Omega$ ; DX350 115W/channel into 8 $\Omega$ ; 190W/channel into 4 $\Omega$ ; 255W/channel into 2 $\Omega$ ; DX500 185W/channel into 8 $\Omega$ ; 350W/channel into 4 $\Omega$ ; DX700 260W/channel into 8 $\Omega$ ; 425W/channel into 4 $\Omega$ ; 625W/channel into 2 $\Omega$ .  
**Total distortion:** 0.04%.  
**Noise:** -100dB.  
**Full power bandwidth:** 20Hz to 20kHz -1dB.  
**Price:** DX140 £248. DX200 £270, DX350 £285, DX500 £335, DX700 £407.

### TX400

Similar to above, this is a triamp with electronic crossover, one 200W and two 100W amps.  
**Price:** £395.



### ICE (UK)

ICElectrics Ltd, 131/132 Blackdown Rural Industries, Haste Hill, Haslemere, Surrey GU27 3AY, UK.  
**Phone:** 0428 2015.

### S200

**Type:** two channel, VU meters.  
**Power:** 115W/channel into 8 $\Omega$ , 175W/channel into 4 $\Omega$ .  
**Distortion:** 0.01% 'calculated'.  
**Noise:** -110dB.  
**Full power bandwidth:** 20Hz to 20kHz.  
**Price:** £314.46.





Substantially more than just a recording console, the Solid State Logic Master Studio System is the world's only thoroughly integrated control room command center. The scope of the system's features affords a degree of creative precision that is without rival; yet the "total controller" approach actually simplifies studio operations. Producers have commented that the SSL brings previously impossible accomplishments within reach, while handling procedures which were once both tedious and difficult almost effortlessly.

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# Solid State Logic

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## Survey

### IVIE (USA)

Ivie Electronics Inc, 500 West 1200 South, Orem,  
Utah 84057, USA.

Phone: (801) 224-1800. Telex: 910-971 5884.

UK: FWO Bauch Ltd, 49 Theobald Street, Boreham  
Wood, Herts WD6 4RZ.

Phone: 01-953 0091. Telex: 27502.

### 5805/5806

Type: 5805 master (may be bridged), 5806 slave (may  
be paralleled with master). Part of the 5000 modular  
sound system.

Power: 100W into 8 $\Omega$ , 140W into 4 $\Omega$ .

Total distortion: 0.025%.

Noise: -105dB.

Full power bandwidth: 20Hz to 20kHz -1dB.

Price: on application.



### JBL (USA)

James B Lansing Sound Inc, 8500 Balboa Blvd,  
Northridge, Cal 91329, USA.

Phone: (213) 893-8411. Telex: 674993.

UK: Haman (Audio) UK Ltd, St John's Road, Tylers  
Green, High Wycombe, Bucks HP10 8HR.

Phone: 049481 5221. Telex: 837116.

### 6007/8/11/12/21/22

Type: single channel, VU meter 6007, 6011, 6021  
have both direct and transformer outputs providing full  
power into 8 or 16 $\Omega$ , or 70V, others have only direct  
outputs.

Power: 6007/6008 60W into 4 $\Omega$ , 6011/6012 100W into  
4 $\Omega$ , 6021/6022 200W into 4 $\Omega$ .

Total distortion: 0.2% at rated output.

Noise: -90dB.

Full power bandwidth: with transformer 35Hz to  
20kHz  $\pm$  1dB, without 20Hz to 20kHz  $\pm$  0.5dB.

Prices: on application.

### 6233

Type: two channel, illuminated level indicators,  
bridgable.

Power: 200W/channel into 8 $\Omega$ , 300W/channel into  
4 $\Omega$ , bridged 700W into 8 $\Omega$ , 400W into 16 $\Omega$ .

Total distortion: 0.05% at rated output.

Noise: -100dB.

Full power bandwidth: 20Hz to 20kHz  $\pm$  0.5dB.

Price: on application.

### JPS (UK)

JPS Associates, Belmont House, Steele Road,  
London NW10 7AR.

Phone: 01-961 1274.

### 1002/2002/3002/5002

Type: two channel, LED level indication.

Power: 1002 100W/channel into 4 $\Omega$ ; 2002 200W/  
channel into 4 $\Omega$ ; 3002 300W/channel into 4 $\Omega$ ; 5002  
500W/channel into 2 $\Omega$ .

Total distortion: 0.06%.

Noise: -115dB.

Full power bandwidth: 10Hz to 20kHz -0.2dB

Prices: 1002 £260, 2002 £325, 3002 £450, 5002 £576.

### JVC (Japan)

UK: JVC UK Ltd, Eldonwall Trading Estate, Staples  
Corner, London NW2.

Phone: 01-450 2621. Telex: 923320.

USA: US JVC Corp, 58-75 Queens Midtown

Expressway, Maspeth, NY 11378.

Phone: (212) 476-8300.

### M-7050

Type: two channels, output meters.

Power: 150W/channel into 8 $\Omega$ .

Total distortion: 0.003%.

Noise: -120dB.

Full power bandwidth: dc to 300kHz -3dB.

Price: £680.

### M-3030

Type: two channels.

Power: 105W/channel into 8 $\Omega$ .

Total distortion: 0.03%.

Noise: -116dB.

Full power bandwidth: dc to 100kHz -1dB.

Price: £488.

### LUX (Japan)

Lux Corp, 1-8-31 Nagahashi, Nishinari-Ku, Osaka,  
Japan.

Phone: 06 632-0031. Telex: 63694.

UK: Howland West Ltd, 3-5 Eden Grove, London N7  
8EQ.

Phone: 01-609 0293. Telex: 299710.

### M4000

Type: two channel, VU meters and LED level indi-  
cation.

Power: 180W/channel into 8 $\Omega$ .

Total distortion: 0.05%

Noise: -108dB.

Full power bandwidth: 20Hz to 20kHz.

Price: £1,050.

### MARANTZ (Japan)

UK: Marantz Audio UK Ltd, Debmarc House, 203  
London Road, Staines, Middx.

Phone: 0784 50132. Telex: 935196.

USA: Superscope Inc, 20525 Nordhoff Street,  
Chatsworth, Cal.

Phone: (213) 998-9333. Telex: 910-494 2760.

### SM100

Type: two channel, analogue meters.

Power: 400W/channel into 8 $\Omega$ , 650W/channel into  
4 $\Omega$ .

Total distortion: 0.03%

Noise: -126dB.

Full power bandwidth: dc to 100kHz -1dB.

Price: about £3,500.

### MCMARTIN (USA)

McMartin Industries Inc, 4500 South 76th Street,  
Omaha, Nebraska 68127, USA.

Phone: (402) 331-200. Telex: 484485.

### LT-500D/1000D/2000D/3500D

Type: single channel, direct or 70V transformer output.

Power: LT-500D 50W, LT-1000D 100W, LT-2000D  
200W, LT-3500D 350W.

Total distortion: 0.5%.

Noise: -80dB.

Full power bandwidth: direct output 30Hz to 20kHz  
 $\pm$  1dB, transformer 30Hz to 15kHz.

Prices: on application.

### METEOR (USA)

Hammond Industries Inc, 155 Michael Drive,  
Syosset, NY 11791, USA.

Phone: (516) 364-1900. Telex: 961396.

UK: C E Hammond & Co, 105-109 Oyster Lane,  
Byfleet, Surrey KT14 7JH.

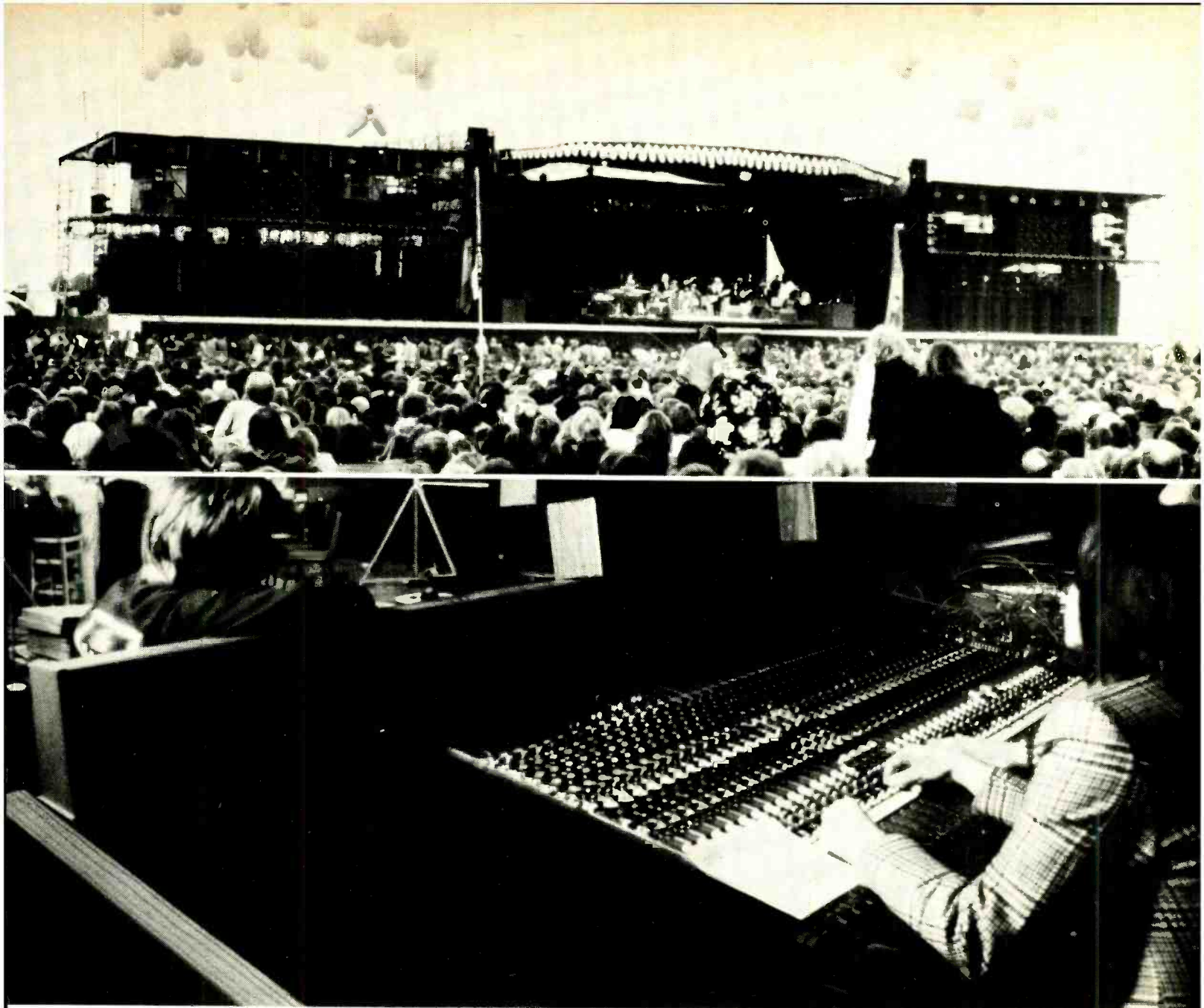
Phone: 09323 51051. Telex: 262525.

### Powermaster 190

Type: two channel, peak LEDs.

Power: 90W/channel into 8 $\Omega$ .





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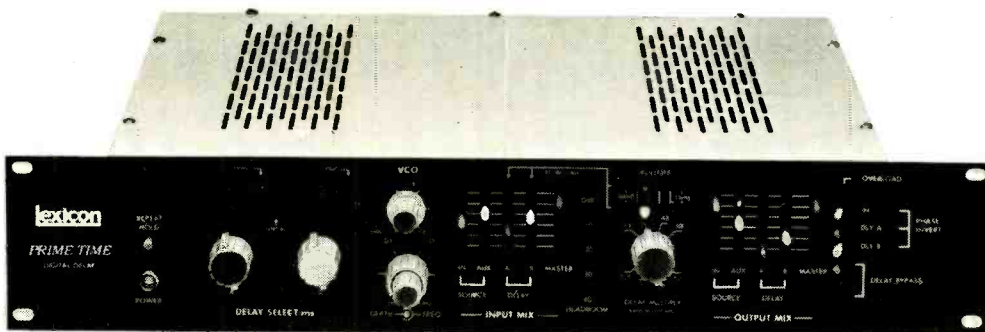
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### F.W.O. Bauch Limited

49 Theobald Street, Boreham Wood, Hertfordshire WD6 4RZ  
Telephone 01-953 0091, Telex 27502

[www.americanradiohistory.com](http://www.americanradiohistory.com)

## Survey



**Total distortion:** 0.09%.  
**Noise:** 87dB.  
**Full power bandwidth:** 20Hz to 20kHz  $\pm 0.5$ dB.  
**Price:** \$499.

### MILLBANK (UK)

Millbank Electronics Group Ltd, Uckfield, Sussex TN22 1PS, UK.  
**Phone:** 0825 4166. **Telex:** 95505.

### PAC System

**Type:** modular single channel mounts in PAC rack.  
**Power:** 40W, 60W, 120W and 250W available.  
**Price:** on application.

### MM ELECTRONICS (UK)

PA:CE Musical Equipment Ltd, 63 Keesworth Street, Royston, Herts SG8 5AQ, UK.  
**Phone:** 0763 46511/45214. **Telex:** 817929.

### AM240/400/640

**Type:** two channel, LED peak indicator standard, option VU meters.  
**Power:** AM240 90W/channel into 8 $\Omega$ , 125W/channel into 4 $\Omega$ ; AM400 125W/channel into 8 $\Omega$ , 200W/channel into 4 $\Omega$ ; AM640 200W/channel into 8 $\Omega$ , 320W/channel into 4 $\Omega$ .  
**Total distortion:** 0.1%  
**Noise:** -100dB.

**Full power bandwidth:** 18kHz.  
**Prices:** with XLRs AM240 £224, AM400 £264, AM640 £332.

### MUSTANG (UK)

Mustang Communications, Industrial Estate, Cayton Low Road, Scarborough, North Yorkshire, UK.  
**Phone:** 0723 582555.

### SS100/SS50

**Type:** single channel, VU meters.  
**Power:** SS50 50W into 15 $\Omega$ , 80W into 7.5 $\Omega$ , SS100 100W into 15 $\Omega$ , 150W into 7.5 $\Omega$ .  
**Total distortion:** 0.5%.  
**Noise:** -96dB.  
**Full power bandwidth:** 10Hz to 20kHz -0.5dB.  
**Price:** SS100 £198.24, SS50 £157.31.

### PANASONIC (Japan)

USA: Panasonic Co, 50 Meadowlands Parkway, Secaucus, New Jersey 07094.  
**Phone:** (201) 348-7000. **Telex:** 710-992 8996.

### Ramsa WP-9210

**Type:** two channel, peak LED indicators.  
**Power:** 200W/channel into 8 $\Omega$ .  
**Total distortion:** 0.05%.  
**Noise:** -105dB.  
**Full power bandwidth:** 20Hz to 20kHz  $\pm 0.5$ dB.  
**Price:** on application.

### PEAVEY (USA)

Peavey Electronics Corp, 711A Street, Meridan, Miss 39301, USA.  
**Phone:** (601) 483-3565.  
 UK: Peavey Electronics (UK) Ltd, Unit 8, New Road, Ridgewood, Uckfield, Sussex TN22 5SX.  
**Phone:** 0825 5566. **Telex:** 957098.

### CS200/400/800

**Type:** CS200 is single channel, 400/800 are two channel, clipping indication.  
**Power:** CS200 and 400 150W into 8 $\Omega$ , 260W into 4 $\Omega$ , 150W into 2 $\Omega$ , CS800 280W/channel into 8 $\Omega$ , 460W/channel into 4 $\Omega$ .  
**Total distortion:** 0.1%.  
**Noise:** -100dB.  
**Full power bandwidth:** 5Hz to 40kHz -1dB at 1W.  
**Prices:** CS200 £251.90, CS400 £379.75, CS800 £503.75.

### QUAD (UK)

Acoustical Manufacturing Co Ltd, Huntingdon, PE18 7DB, UK.  
**Phone:** 0480 52561. **Telex:** 32348.

### 405

**Type:** two channel, current dumping output circuit.  
**Power:** 100W/channel into 8 $\Omega$ .  
**Total distortion:** 0.05%.  
**Noise:** -90dB.  
**Full power bandwidth:** 20Hz to 50kHz -3dB.  
**Price:** £229.

### 303

**Type:** two channel.  
**Power:** 45W/channel into 8 $\Omega$ .  
**Total distortion:** 0.1%.  
**Noise:** -95dB.  
**Full power bandwidth:** 30Hz to 35kHz -3dB.  
**Price:** £136.

### QMI (USA)

QMI, 21356 Deering Court, Canoga Park, Cal 91304, USA.  
**Phone:** (213) 340-1313.  
 UK: Music Laboratory, 72-74 Eversholt Street, London NW1.  
**Phone:** 01-388 5392.

### GC500

**Type:** two channel.  
**Power:** 200W/channel into 8 $\Omega$ , 350W/channel into 4 $\Omega$ , 500W/channel into 2 $\Omega$ .  
**Total distortion:** 0.05%.  
**Noise:** not stated.  
**Full power bandwidth:** 5Hz to 50kHz  $\pm 0.5$ dB.  
**Price:** £525.

### RAINDIRK (UK)

Raindirk Ltd, Bridge Street, Downham Market, Norfolk, UK.  
**Phone:** 03663 2165. **Telex:** 817737.  
 USA: Audicon Marketing Group, 1200 Beechwood Avenue, Nashville, Tenn 37212.  
**Phone:** (615) 256-6900. **Telex:** 554494.

### SV500

**Type:** two channel, MOS-FET output, optional LED level indication.  
**Power:** 250W/channel into 8 $\Omega$ , 450W/channel into 4 $\Omega$ , 650W/channel into 2.5 $\Omega$ , bridged mono 850W into 4 $\Omega$ .  
**Total distortion:** 0.02%.  
**Noise:** -100dB.  
**Full power bandwidth:** 20Hz to 20kHz -0.2dB.  
**Price:** £550, meters £50 extra.

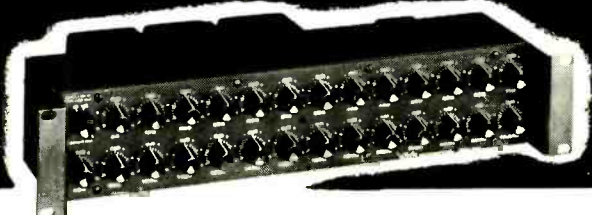
### RSD (UK)

Recording Studio Design, Faircharm Trading Estate, Chaul End Lane, Leagrave, Luton, Beds, UK.  
**Phone:** 0525 570621. **Telex:** 825612.  
 USA: Studiomaster Inc, 1365C Dynamics, Anaheim, Cal 92806.

### 800C

**Type:** two channel, VU meters.  
**Power:** 220W/channel into 8 $\Omega$ , 400W/channel into 4 $\Omega$ , 600W/channel into 2 $\Omega$ .  
**Total distortion:** 0.25%.  
**Noise:** -100dB.  
**Full power bandwidth:** 5Hz to 30kHz -3dB.  
**Price:** £576.99.

## TOWARD BETTER UNDERSTANDING . . .



The Model 4240 Active Equalizer is a hybrid of ONE-SIXTH octave filters, which are concentrated in the *speech intelligibility* region between 250 and 2000 Hz, and broader bandwidth filters on either end. The intended application of the Model 4240 is the equalization of sound reinforcement systems employing *voice* as the main program material as in corporate boardrooms, meeting halls, legislative chambers and courtrooms.

Extremely high Q room modes which cause feedback, ringing and loss of intelligibility are excited by these mid-range frequencies. Equalization to suppress these modes using one-third octave or broader bandwidth filters can attenuate other frequencies necessary to *voice intelligibility*. Loss of intelligibility can not be compensated by increased gain.

By comparison the ONE-SIXTH octave filters used in the Model 4240 have TWICE the resolution as one-third octave filters. It is possible to equalize a sound system and affect only HALF as much program material.

The Model 4240 Equalizer is highly cost-effective for these applications since it is built on the same chassis as our one-third octave models. It has 27 filters like the one-third octave units, but 19 are ONE-SIXTH octave and concentrated in the midrange. The broader bandwidth filters on either end are more than adequate to shape the extreme low and high ends of the spectrum.

Our new System 200 Signal Analyzer features field interchangeable, plug-in filters and may be equipped to match the Model 4240 Equalizer making ONE-SIXTH octave adjustment as convenient as one-third octave.

*Remember it, Where Voice Clarity is Important*

**White instruments, incorporated**

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# TSM- Mixing with Style

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 Telephone: Chertsey (09328) 60241 Telex: 8813982



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**Australia** John Barry Group, Sydney, Tel. 61-2-439-6955  
**Canada** Radio Services Inc., Montreal, Tel. 514-342-2511  
**Finland** Into OY, Helsinki, Tel. 90-742-133  
**France** Lazare Electronics, Paris, Tel. 33-1-878-62-10  
**Germany** Products International, Milan, Tel. 03-544-8400  
**Japan** Nissho Electronics Corporation, Tokyo, Tel. 03-544-8400  
**New Zealand** Mandrill Recording Studios, Auckland, Tel. 793222  
**Norway** Protechnic AS, Oslo, Tel. 02-46-05-54  
**South Africa** Leechy (Pty) Ltd., Johannesburg, Tel. 27-11-48-3821  
**Spain** Neotechnica SAE, Madrid, Tel. 34-1-242-09-00  
**Sweden** Stage 8 Studio KB, Kungälv, Tel. 0303-503-48  
**Taiwan** Linfair Eng. Ltd., Taipei, Tel. 321-4454/7



# Survey

## ROLAND (Japan)

USA: Roland Corp US, 2401 Saybrook Avenue, Los Angeles, Cal 90040.

Phone: (213) 685-5141.

UK: Brodr Jorgensen (UK) Ltd, Great West Trading Estate, 983 Great West Road, Brentford, Middx TW8 9DN.

Phone: 01-568 4578. Telex: 934470.

## SPA120/240

Type: two channel.

Power: SPA120 60W/channel into 8 $\Omega$ , SPA240 120W/channel into 8 $\Omega$ .

Total distortion: 0.05%.

Noise: -110dB.

Full power bandwidth: 10Hz to 100kHz.

Price: SPA120 £188.97, SPA240 £305.22.

## SAE (USA)

Scientific Audio Electronics Inc, PO Box 60271, Terminal Annex, Los Angeles, Cal 90060, USA.

Phone: (213) 489-7600. Telex: 674062.

UK: CE Hammond & Co, 105-109 Oyster Lane, Byfleet, Surrey KT14 7JH.

Phone: 09323 51051. Telex: 262525.

## 3100/2200/2300/2400L/2600

Type: two channel, LED level indication except 2600 which has meters.

Power: into 8 $\Omega$  respectively 50, 100, 150, 200, and 400W.

Total distortion: 0.05%.

Noise: -100dB.

Full power bandwidth: 20Hz to 20kHz +0.25 -3dB.

Prices: 3100 £235, 2200 £365, 2300 £500, 2400L £610, 2600 £965.

## SHURE (USA)

Shure Brothers Inc, 222 Hartrey Avenue, Evanston, Illinois 60204, USA.

Phone: (312) 866-2200. Telex: 724381.

UK: Shure Electronics Ltd, Eccleston Road, Maidstone ME15 6AU.

Phone: 0622 59881. Telex: 96121.

## SR105

Type: single channel, meter level indication, optional transformer output for 70 and 100V lines.

Power: direct 200W into 4 $\Omega$ , transformer 150W into loads.

Total distortion: 2%.

Noise: -80dB.

Full power bandwidth: 20Hz to 20kHz  $\pm$ 1.5dB, transformer 50Hz to 15kHz  $\pm$ 2dB.

Price: on application.

## SOLIDYNE (Argentina)

Solidyne SRL, Tres de Febrero 3254, 1429 Buenos Aires, Argentina.

Phone: 701-8622.

## 7000A

Type: two channels, peak LED indicators, mono, stereo or biamp with internal electronic crossover. Drives 70 and 100V lines directly.

Power: 230W/channel into 8 $\Omega$ , 350W/channel into 4 $\Omega$ , bridged 700W into 8 $\Omega$ .

Total distortion: 0.01%.

Noise: -95dB.

Full power bandwidth: 20Hz to 30kHz  $\pm$ 0.25dB

Price: on application.

## SOUNDOUT/FRUNT (UK)

Soundout Laboratories Ltd, 91 Ewell Road, Surbiton, Surrey KT6 6AH, UK.

Phone: 01-399 3392. Telex: 8951073.

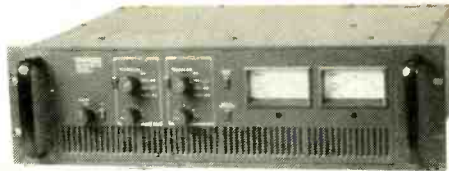
## 400S/200S

Type: two channel, 400S has same output power, but separate power supplies for each channel.

Power: 130W/channel into 8 $\Omega$ , 200W into 4 $\Omega$ .

Total distortion: 0.05%.

Noise: -98dB.



Tapco CP 500M

Full power bandwidth: 10Hz to 25kHz -2dB.

Price: 400S £321, 200S £240.

## 420S/260S

Type: two channel, LED peak indicators.

Power: 260S 130W/channel into 8 $\Omega$ , 420S 130W/channel, into 8 $\Omega$ , 200W/channel into 4 $\Omega$ .

Total distortion: 0.05%.

Noise: -98dB.

Full power bandwidth: 10Hz to 25kHz -2dB.

Prices: 420S £300, 260S £213.

## SPECTRA SONICS (USA)

Spectra Sonics, 3750 Airport Road, Ogden, Utah 84403, USA.

Phone: (801) 392-7531.

## Model 701

Type: modular amplifier system with eight modules fitting a rack mount.

Power: 80W into 2 $\Omega$ , bridgable in pairs for 160W into 4 $\Omega$ .

Total distortion: 0.01%.

Noise: -122dB.

Full power bandwidth: dc to 20kHz  $\pm$ 0.3dB.

Price: on application.

## STUDER/REVOX (Switzerland)

Studer International AG, Althardstrasse 150, CH-8105 Regensdorf, Switzerland.

Phone: 01 840.29.60. Telex: 584889.

UK: FWO Bauch Ltd, 49 Theobald Street, Boreham Wood, Herts WD6 4RZ.

Phone: 01-953 0091. Telex: 27502.

USA: Studer Revox America Inc, 1819 Broadway, Nashville, Tenn 37203.

Phone: (615) 329-9576. Telex: 554453.



## A68

Type: two channel, overload indication.

Power: 100W/channel into 8 $\Omega$ , 175W/channel into 4 $\Omega$ , bridgable mono 350W into 8 $\Omega$ .

Total distortion: 0.1%.

Noise: -100dB.

Full power bandwidth: 20Hz to 20kHz -dB.

Price: £559.

## A740

Similar to above, but Revox range for consumer applications. Less XLR, with VU meters etc.

Price: £750.

## TANDBERG (Norway)

UK: Tandberg Ltd, 81 Kirkstall Road, Leeds LS3 1HR. Phone: 0532 3511. Telex: 557611.

USA: Tandberg of America Inc, Labriola Court, Armonk, NY 10504.

Phone: (914) 273-9150. Telex: 13757.

## 3003

Type: two channel, LED clipping indicators.

Power: 150W/channel into 8 $\Omega$ .

Total distortion: 0.02%.

Noise: -98dB.

Full power bandwidth: 20Hz to 20kHz -0.2dB.

Price: £443.48.

## TAPCO (USA)

Tapco, a Gulton Company, 3810 148th NE, Redmond, Washington 98052, USA.

Phone: (206) 883-3510. Telex: 910-449 2594.

UK: Electro-Voice (Gulton Europe) Ltd, Maple Works, Old Shoreham Road, Hove, Sussex BN3 7EY.

Phone: (616) 695-6831. Telex: 87680.

## CP120/500/500M

Type: two channels, 500M has VU meters.

Power: CP120 50W/channel into 8 $\Omega$ , 61W/channel into 4 $\Omega$ , 122W mono bridged; CP500 150W/channel into 8 $\Omega$ , 255W/channel into 4 $\Omega$ , 510W mono bridged.

Total distortion: 0.05%

Noise: -95dB.

Full power bandwidth: 20Hz to 20kHz -0.4dB.

Price: CP120 \$650, CP500 \$1,075, CP500M \$1,275.

## TRESHAM (UK)

Tresham Audio Ltd, 32 Tresham Road, Orton, Southgate, Peterborough, Cambs, UK.

Phone: 0733 234340.

## SR402/202

Type: two channel, peak LEDs, MOS FET outputs.

Power: SR202 160W/channels into 8 $\Omega$ , 220W/channel into 4 $\Omega$ , 250W/channel into 2.5 $\Omega$ ; SR402 220W/channel into 8 $\Omega$ , 400W/channel into 4 $\Omega$ , 600W/channel into 2.5 $\Omega$ .

Total distortion: 0.02%.

Noise: -110dB.

Full power bandwidth: 20Hz to 20kHz -0.2dB.

Price: SR402 £663, SR202 £468.

## TURNER (UK)

Turner Electronic Industries, 175 Uxbridge Road, London W7 3TH, UK.

Phone: 01-567 8472.

## B502/B302

Type: two channel.

Power: B302 100W/channel into 8 $\Omega$ , 150W/channel into 4 $\Omega$ ; B502 190W/channel into 8 $\Omega$ , 340W/channel into 4 $\Omega$ .

Total distortion: 0.005%.

Noise: 'totally inaudible'.

Full power bandwidth: 20Hz to 20kHz  $\pm$ 0.1dB.

Price: B302 £325, B502 £460.

## UREI (USA)

United Recording Electronics Industries, 8460 San Fernando Road, Sun Valley, Cal 91352, USA.

Phone: (213) 767-1000. Telex: 651389.

UK: FWO Bauch Ltd, 49 Theobald Street, Boreham Wood, Herts WD6 4RZ.

Phone: 01-953 0091. Telex: 27502.

## 6500

Type: two channel, overload LEDs.

Power: 275W/channel into 8 $\Omega$ , 450W/channel into 4 $\Omega$ , 600W/channel into 2 $\Omega$ , mono bridged 900W into 8 $\Omega$ , 1.2kW into 4 $\Omega$ .

Total distortion: 0.5% max into 2 $\Omega$ .

Noise: -100dB.

Full power bandwidth: 20Hz to 20kHz -1dB.

Price: about \$1,996.

## YAMAHA (Japan)

Nippon Gakki Co Ltd, Hamamatsu, Japan.

UK: Ban Electromusic, 97 St John Street, London EC1M 4AB.

Phone: 01-253 9410/9079. Telex: 25960.

## P2050/2100/2201/2200

Type: two channel, 2200 has output meters.

Power: P2050 45W/channel into 8 $\Omega$ , 60W/channel into 4 $\Omega$ ; P2100 85W/channel into 8 $\Omega$ ; P2201 200W/channel into 8 $\Omega$ , 350W/channel into 4 $\Omega$ ; P2200 200W/channel into 8 $\Omega$ .

Total distortion: 0.05%.

Noise: -110dB.

Full power bandwidth: 20Hz to 50kHz -0.5dB.

Price: P2050 £180, P2100 £260, P2201 £345, P2200 £395.



# PROGRESSIVE ELECTRONIC PRODUCTS

593 High Road, LEYTON, LONDON E10 6PY

Tel: 01-558 0678

## Price List as at 31st March, 1980

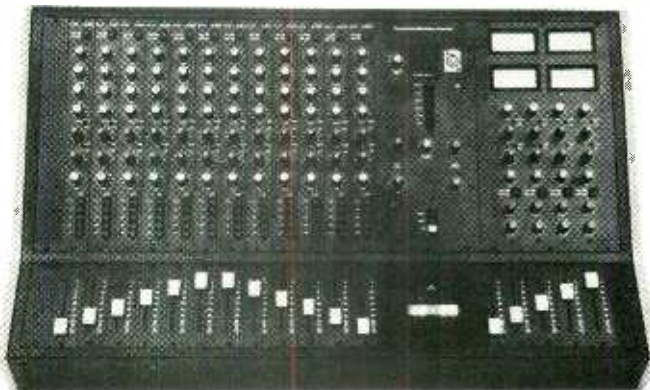
MBC	— 1	Meter Buffer Card	... ..	£3.68
MIC	— 1	Microphone Pre Amplifier	... ..	£8.50
BAX	— 1	Bass and Treble Tone Control	... ..	£7.40
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GAP	— 1	General Purpose Amplifier	... ..	£5.48
SFR	— 1	Scratch Filter	... ..	£7.55
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Frame Work for Use With CM — 1 and GM — 1				P.O.A.

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Cash with order, except approved accounts.

All Prices subject to 15% VAT.

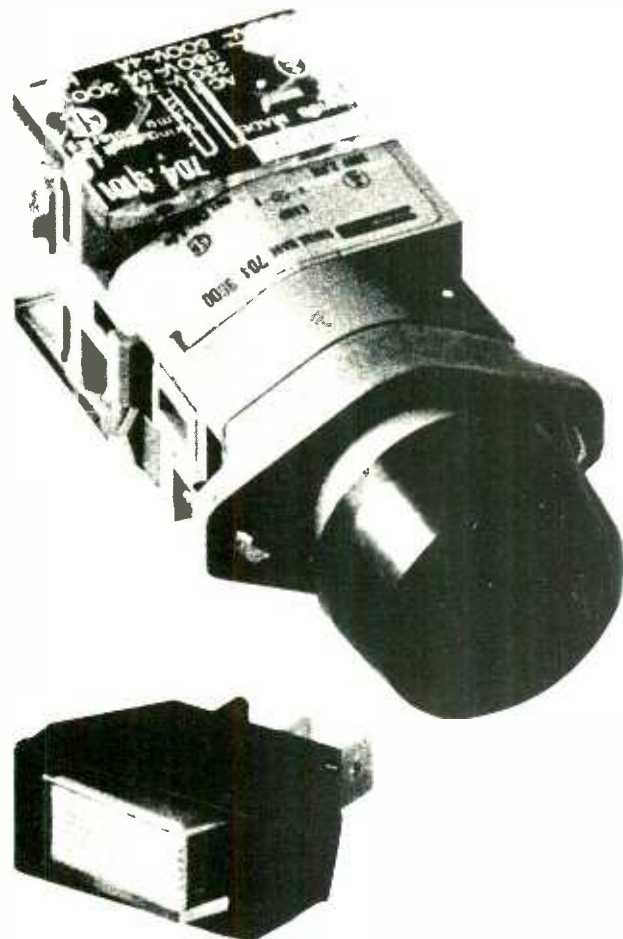
75p Postage and Packing per order, except on items marked with \*, which will be charged at £2.00 per order.



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Two power switches. Both are rated at 16A/250V. The one on the left is specified for a minimum of 10000 operations. The one on the right is specified for 100 000 operations. The one on the left is a good general purpose power switch. The one on the right is without doubt the best power switch at this rating. The one on the left is widely used in household applications, consumer and communication electronics and in well-known power amplifiers. The one on the right is widely used in air- and spacecraft, heavy-duty industrial applications and in the FM ACOUSTICS power amplifiers. In quantities of 100 pieces the one on the left costs about 30 Pence each, the one on the right about 3½ Pounds each. Just one of the reasons why the power amplifiers made by FM ACOUSTICS are more expensive and more reliable than all others.

Unnecessary overdesign? Maybe that this kind of quality is not necessary for standard applications but it is a must in true professional installations where long-term reliability is more important than initial price.

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# Apbh

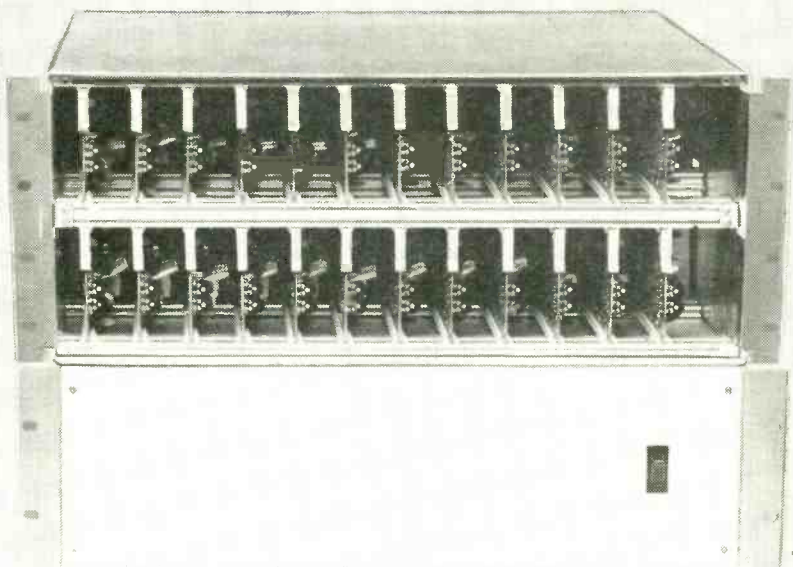
Apex Audio products are known and respected throughout the world for reliability and superb specifications. Here are five such products for the 1980's, each designed to give you a better sound.

## OAS-24 Grouping and Automation System

It provides up to 10 subgroups from 24 audio channels, using B&B voltage controlled attenuators.

The system comes in 3 parts; Control console, with 9 group modules each containing grouping switches, mute switch and fader, and one master module; VCA case with appropriate number of VCA cards; and power supply.

You can use it to extend the life of your console at a fraction of the cost of a new board, or move it from one studio to another any time you want, therefore taking extra capability only where you need it.



If you want full details on these products please contact any of the worldwide Apex companies.

**Apex Audio Systems UK Ltd**  
35 Britannia Row  
London N1 8QH England  
Telephone: 01-359 5275/0955  
Telex: 268279

**APHEX SYSTEMS LTD.**  
7801 Melrose Avenue,  
Los Angeles,  
California 90046  
Tel: (213) 655-1411  
TWX: 910-321-5762

**APHEX AUDIO SYSTEMS  
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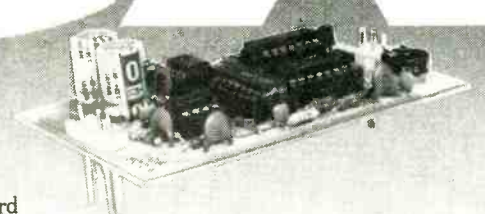
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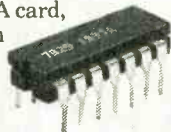
### B&B VCA 500A Card

This is a retrofit VCA for the MCI 500 Series and requires no additional circuitry.

THD, IMD and modulation noise are down to their theoretical limits as a result of patented "Class A" circuitry. Thus the 500A is free of colouration and distortion.

In addition, there is a B&B VCA 505 Universal Card which has a 15-pin edge mount, and buffered inputs. All the op-amps are on sockets so when even more sophisticated devices become available, they can be updated easily.

The 1537A VCA chips, which are the heart of the 500A card, are available separately for those who want to design their own applications.



### B&B EQF2 Parametric Equaliser/Filter

Equalisation is switchable peak or shelf, with reciprocal cut or boost. Filtering is tunable high and low pass.

The B&B EQF2 covers the full audio band from 20Hz to 20kHz, and over each of its three frequency ranges it maintains a constant Q.

It is a high quality device well-known as a powerful and creative tool in the studio. Its response curves were chosen carefully to sound good and not just look good on paper.

It is illustrated in the new racking system which accommodates up to 10 devices, each of which plugs directly into the rear mother board.



### Model 602B Aural Exciter

This is the most up-to-date model, and includes all the technical modifications made over 3 years of laboratory test and field usage.

Thousands of albums have been economically processed by Aphex and the results universally acclaimed.

Demand has become so great that the 602B can now be bought outright, but is still available on lease, as before, for those who wish.

**NEW MODEL**

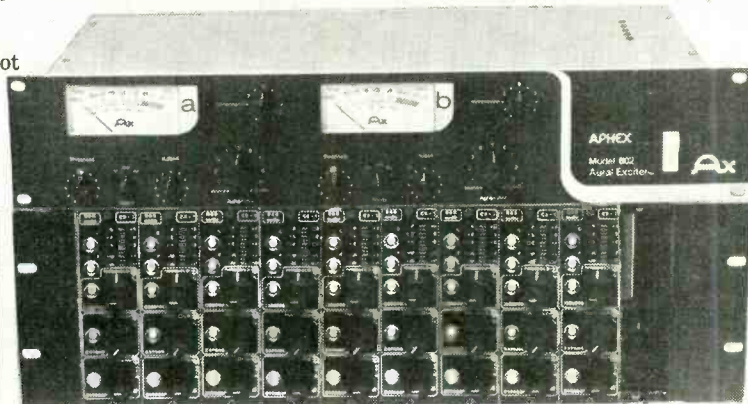
### B&B CX1 Compressor - Expander

As a compressor, release time is variable from 50 msec to 2.5 sec, and threshold operates from -40dBv to +20dBv.

As an expander, release time is variable from 50 msec to 2.5 sec, and threshold operates from -75dBv to -10dBv.

Attack time for both the compressor and the expander is less than 1µsec. The CX1 has 9 controllable functions and a built-in 10-segment bargraph display for metering any one of 4 different signal levels.

It is illustrated in the new racking system which accommodates up to 10 devices, each of which plugs directly into the rear mother board.



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**take note:**

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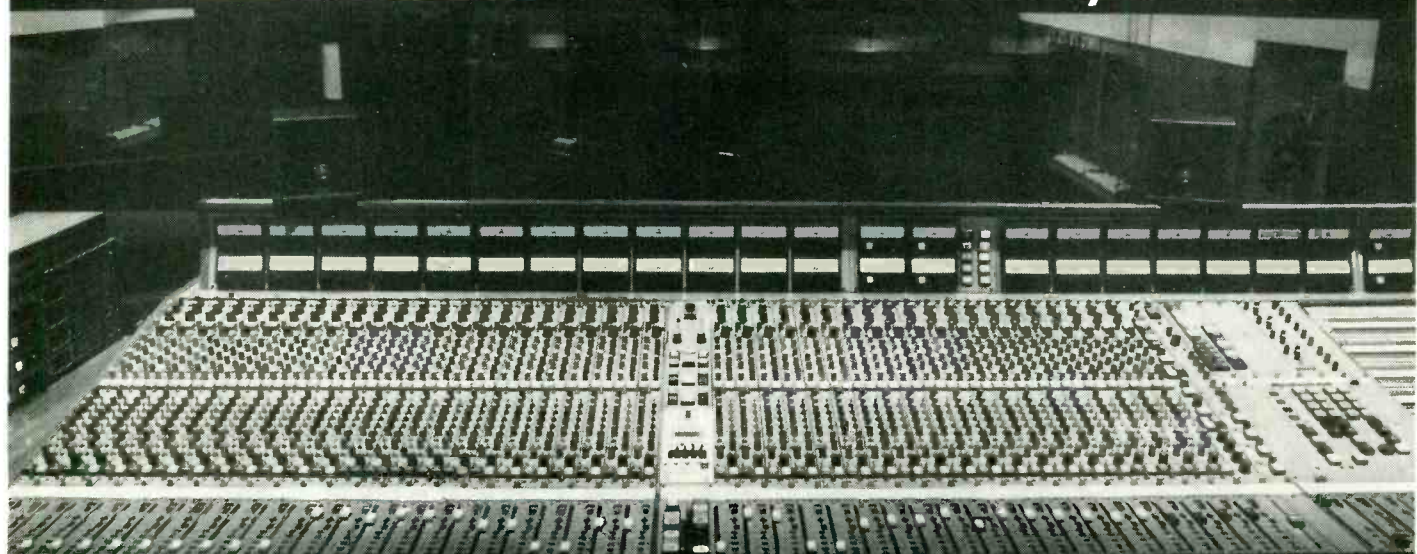
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Milan Fair Ground, pavilions 19,20,21,26,41F-42  
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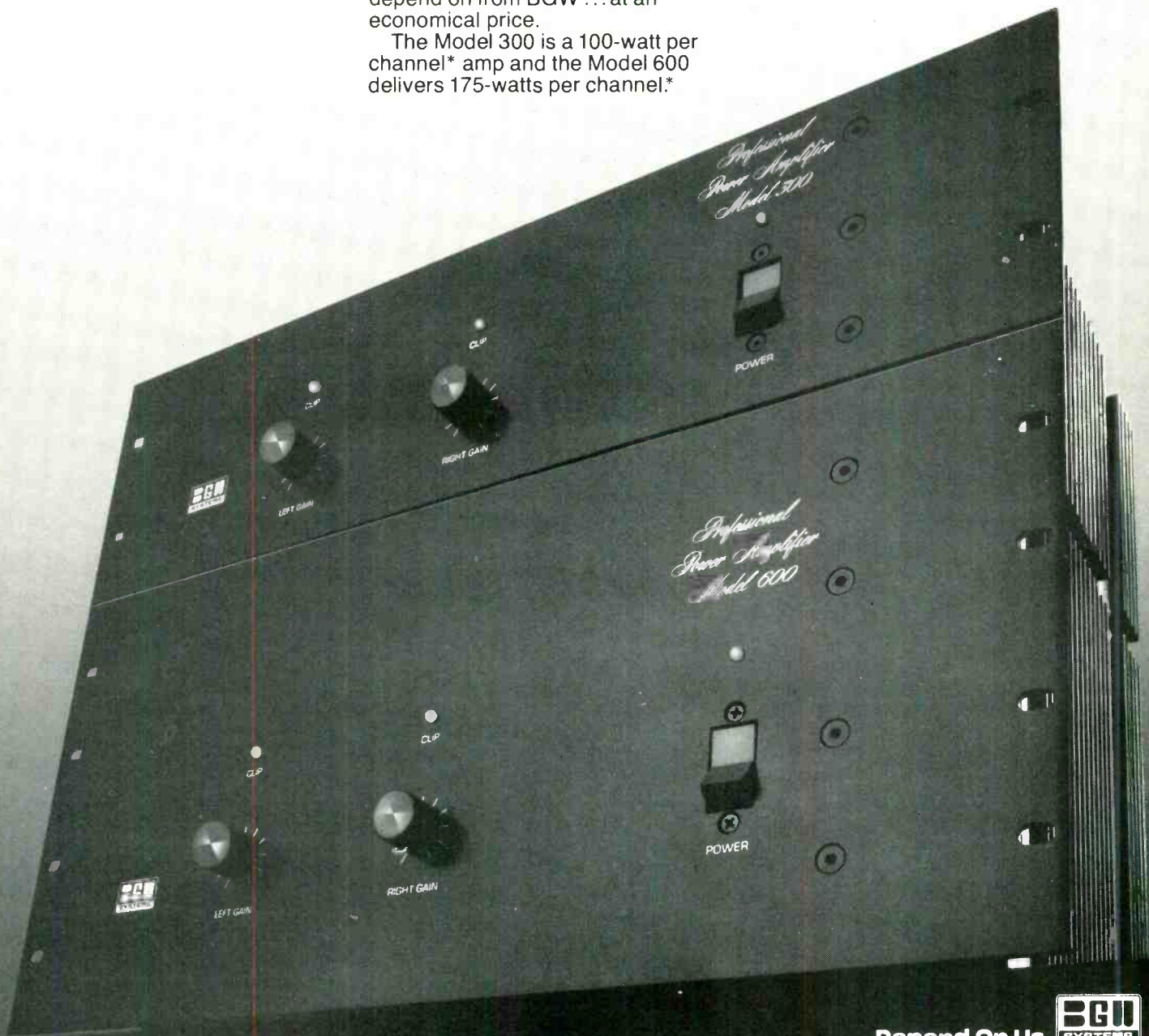
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# AES 66th Convention, Los Angeles - A Report

Angus Robertson



**The 66th Convention of the Audio Engineering Society took place in Los Angeles, from May 6 to 9. Angus Robertson reports on the exhibition.**

**B**EFORE I report on the convention, it is necessary to mention the basis on which these reports are written because a few manufacturers are under the wrong impression of their purpose. During each year, *Studio Sound* reports on six exhibitions, and produces previews of at least four. A few major companies exhibit at each of these six exhibitions, and in theory could be mentioned 10 times a year in *Studio Sound* — and is it really necessary to point out that Studer make excellent tape recorders 10 times each year? With the larger exhibitions now having over 150 exhibitors, there would be no space for any other articles in *Studio Sound* if each company was covered each time. So in practice, we make the previews as complete as possible (although not all companies are prepared to supply information before our deadlines), but written as compactly as possible (for which Noel Bell is to be complimented), while the reports cover products new to that exhibition or which haven't been covered previously in *Studio Sound*. So while we might write about new mixers or those presented as improved, at a particular show, the reports are not intended to provide a list of every single manufacturer at the exhibition — that is the purpose of our regular surveys. While obviously the onus is on us to discover that which is new, occasionally we miss something and often exhibitors themselves show little interest in promoting their products to both ourselves and visitors — they are too busy talking amongst themselves or with 'friends', or even worse the

booth is unattended. So while reports are as complete as we can make them, they are not perfect — but we try.

But back to the convention. This was the largest the AES has yet held with over 6,000 attending over the four days of the exhibition, which had about 185 companies presenting their products and services. There was no overall talking point at the convention, apart perhaps for the overall gloom the industry is still suffering, but there was certainly news about new digital tape recorders, although none that are likely to be marketed this year.

## Digital recording

During the last two years, it has slowly become obvious that the chance of any digital recording standards being originated in the United States are remote, partly because there are so many interested parties, and partly because of the anti-trust laws which prevent precisely this type of standardisation being achieved. So perhaps it is for companies outside the United States to make some offering on the digital front, with the hope that the United States might follow suit.

The Swiss company **Willi Studer** is certainly one of the leading manufacturers of multitrack tape recorders in the world, and while **Sony** does not presently manufacture professional recorders, it has been actively demonstrating digital fixed tape recorders for about 18 months and has had the distinction of being the only company other than 3M actually marketing digital recorders (the *PCM 1600* unit based on video cassette recorders). So in the first concrete step toward some form of standardisation, it was announced at AES that Sony and Studer have reached an agreement to support a common format in stationary head digital audio recording, with Studer having access to Sony's

advanced digital tape recorder technology. Both companies hope that their common format will be widely accepted in the industry as an international specification in stationary head recording. So each company will be making its own multitrack, but using a common format, so there is immediately dual sourcing — something that is particularly important.

Precisely how the new format is arranged is something that Studer and Sony wish to keep quiet about until they have had the opportunity to present it to the appropriate industry committees, but what there are prepared to say is that it is a versatile format offering a number of different channel permutations on the same recorder ranging from two to 48 with a wide range of speeds, and that the format includes newly developed and highly efficient coding for error protection and high density recordings. The Sony *PCM-3204* offers four digital channels, two analogue and one timecode channels, all on  $\frac{1}{4}$ in tape at 15in/s, (rather better packing density than 3M) so it would seem likely that the new format will offer 48 channels on 1in tape, with one track per channel, or perhaps less channels with more tracks per channel, but lower tape speed.

Like Sony, Studer has also published a booklet describing its commitment to both analogue and digital audio and which describes PCM recording, how it works, the problems of recording and playing back digital samples, and a short non-specific piece on standards which finishes: 'How should standards emerge? Perhaps by consensus, though we doubt it. If the process of standardisation by conference is too slow, the proposals of a major manufacturer of audio PCM should be adopted'. It seems likely that this new format, and possibly standard, will finally emerge as prototypes early in 1981.

But one new format shown for the first time

was from **Technics** (one of the trade names of Matsushita). Being promoted as a 'complete digital recording system' and including a stationary head digital recorder with either two or four digital channels (no multitrack yet planned), electronic editing controller, digital preview unit and a digital audio mixer. The mixer does not yet include any form of equalisation (which Matsushita acknowledges as being essential for most applications), but has eight input channels all taking digital signals, four line in and four aux channels (for echo or effects return), while there are four aux outputs (again digital) for effects etc. and two line outputs available in both analogue (for monitoring) and digital (for recording) formats. The mixer includes panning and LED segment displays on each input and output. The digital preview unit provides a keyboard selectable delay for the master signal with respect to the monitor output (which would be fed as a preview signal to the disc cutter). The unit includes D/A converters for both outputs and can provide delays from 0.1 to 1.6s. The Technics digital tape recorder has a format very similar to the existing Sony stationary head recorder, but provides four analogue tracks (rather than three) in addition to four digital channels (four digital tracks per channel) on 1/4in tape running at only 15in/s with an option for only two digital channels. Technics suggest that for multitrack applications, two or more 4-channel systems may be locked together using timecode on one of the audio tracks.

Thin film evaporated heads are used, (20-tracks on 1/4in tape) the analogue tracks being 0.5mm wide, the digital tracks 0.24mm, not including guard bands), which were illustrated in

last year's Los Angeles AES report in *Studio Sound*, these heads allow 22kbit/in. or greater, recording and playback in the digital domain, while the format includes inter-block gaps allowing simplified electronic editing including punch in and out (insert editing). A separate head it used for timecode reading simplifying construction of the thin film heads which might not take happily to fast spooling. Both analogue and digital inputs and outputs are provided, depending upon the particular application, with the digital sampling being standard 16-bit linear and 50.4kHz sampling. All operations can be remote controlled, the remote unit providing 10 memory positions and autolocate facilities.

While physical editing of digital tape is possible when interblock gap are left (in theory anyhow), electronic editing is really the only practical method, and Technics also demonstrated an editing console. This provides editing point locating by storing up to 8s of off-tape material in a digital memory with a variable rate readout clock providing a search facility and slow speed playback. memories are provided for the in and out points of edits (using timecode), with a preview facility to allow the edit to be rehearsed before actually being made. Rather than a direct cut which can often be noticeable, the edit entry is a crossfade selectable in duration from 1ms to 300ms, while the fade out time is from 100ms to 1s. Editing accuracy is 119µs. Technics suggests that this digital tape recording system will be on the market during early 1981, but pricing is not yet available.

For several past AES conventions, JVC has been demonstrating a consumer oriented PCM adaptor for video cassette recorders, but at this

convention introduced the *Series 90* digital audio mastering system using rotary head *U-Matic* format video cassette recorders as the recording medium. The system is based on the *BP-90* digital audio recording processor that uses another new format *BP* — 16-bit linear quantisation with a 44.056kHz sampling frequency and 3.084MHz transmission rate. It seems unlikely that this format is compatible with the established Sony *PCM-1600*, primarily because Sony record on high band *U-Matics*, while JVC still only manufactures low band models. Two digital audio channels are recorded on the video format, which already has two analogue tracks which may be used for timecode and editing. There are four modes on the *BP-90*, normal recording, dubbing, synchronous (for editing) and external signal monitor.

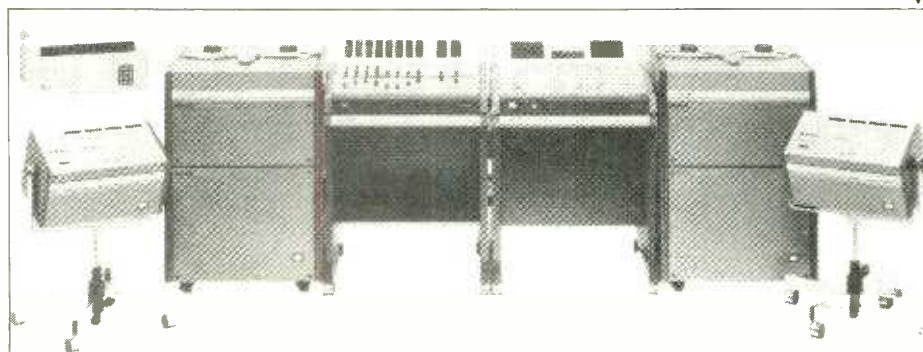
JVC has plenty of experience with electronic editing on video formats, and has developed the *AE-90* digital audio editor to operate with the *BP-90* processor and a pair of *U-Matic* machines. Accuracy of editing is 45µs while a rehearsal memory of 5.92s is provided to enable searching and location of edit points without running the tapes. Once an edit point has been located, it may be shifted in 2ms steps and fully rehearsed before the edit is finally made. Again, rather than a direct cut, crossfading may be selected in steps of 0, 10, 17 and 40ms, with both cut-in and cut-out points selectable. Finally, there is the *CD-90* digital audio delay unit for disc previewing. Delay may be set up to 1.5s in 6ms steps, with the unit including a D/A for the preview signal, but returning the main signal to the processor for conversion. JVC were non-specific on delivery, suggesting 1981.

As the current leader in the fixed head digital recording field, 3M were again demonstrating 32- and 4-channel digital recorders, with an electronic editing system. 3M announced that later this year a crossfade option will be made available for the digital editor, with a 10ms crossfade duration. The crossfade option will first be field tested in studios already using the digital editor.

While not represented at the AES Convention this year, the effort put in by EMI in the digital field should not be forgotten. Possibly the reason for the lack of information is the uncertainty about the future of various EMI divisions, following the takeover by Thorn earlier this year. Indeed the medical electronics division has already been sold to American General Electric, their principal competitor. EMI Central Research Laboratories in Hayes have been investigating digital audio for several years, and basically had three projects running. The first was a stereo digital recorder using FMI instrumentation data recorders (like *Soundstream*) and digital adaptors, together with a comprehensive electronic editing system. These systems have been used on several occasions by Abbey Road Studios for recording classical work. A more conventional digital tape recorder was also under joint development by EMI and MCI, with the former supplying electronics, and the latter tape transport. But the most significant project was a totally digital multitrack music recording console with 16 channels, auxiliary sends, routing, and most important full digital equalisation, something that no other manufacturer has yet attempted. Late last year the console was demonstrated to me at Hayes, and it definitely exists in a fully operational state, and has been used for music recording at Abbey Road already. Equalisation is selected for each channel from a single panel which allows specific



◀ JVC Series 90 digital audio mastering system using U-Matics



Technics digital recording system with mixer and editor centre ▼



## AES Report

parameters to be entered for each channel, such as turnover point and slope. The console is mini-computer, and fully automated with endless band type faders with LED positional indication. While the console itself was relatively compact, it was supported by three racks packed with electronics and the computer. Perhaps it will not be long before this console is publicly demonstrated, proving that the British do indeed have something to contribute to the digital audio scene.

### Analogue recording

Returning to the analogue world of recording, **Studer** were showing some new additions to the *A800* multitrack. The head assembly has been rearranged so that the erase head is now adjacent to the record head, simplifying the problems of timing during electronic editing, while Hall effect switches are now used for the operational controls to improve reliability, and some software changes have been made including a facility that flashes the wind buttons as a warning when the varispeed mode is entered. The new head block will also be introduced on the *A80* this year.

**Ampex** demonstrated (at length and very thoroughly) a new auto-bias accessory for the *ATR-124* multitrack tape recorder. Controlled by two switches that allow the degree of over-bias to be preset (in 1dB and ¼dB steps), a single button depression allows all 24 channels to be automatically aligned. Different biasing frequencies may be used for different speeds, again selected automatically, the whole procedure taking about 10s, but saving much more time. It also eliminates the problem of different people using different alignment. Being software controlled, Ampex have built a number of other diagnostic routines into the *ATR-124*, so that particular fault conditions can be located, and allowing all the switches and LEDs to be sequentially checked for correct operation.

**Teac** introduced the new *Tascam 32-2B* which is an upgraded version of the basic 2-track mastering recorder in the *Tascam Creative* series. Independent left/right record selectors and monitoring capabilities have been added to give more flexibility, selectable IEC and NAB

equalisation, and a closed loop transport design that isolates the tape between two capstans. Spool capacity is 10½in, tape speed 15/7½in/s, three dc motors, motion sensing, ±6% pitch control, optional dbx and full remote control facilities are available.

Something that I missed at NAB was the new *Tomcat* cartridge machine from **Pacific Recorders & Engineering Corp.**, San Diego. While *Tomcat* uses standard NAB AA cartridges, there are several differences in the recorded format, which Pacific Recorders believe provide the first attempt to improve on the NAB stereo format. Normally, the stereo format has three identical width tracks, two for audio and one for cue tones. Obviously, the response of the cue track is not as critical as the audio tracks, so Pacific Recorders has increased these to 80mil each, leaving 21mils for the cue track, and this increase gives unweighted noise of -59dB and -62dB A weighted, with a frequency response of 40Hz to 16kHz +0.5dB at 7½in/s, improving to 55Hz to 22kHz ±1dB when used at the alternative speed of 15in/s. Phase has always been a problem on stereo cartridges, and while *Tomcat* allows a normal discrete stereo recording, it is also equipped with an internal matrix that allows left+right (sum) to be recorded on one track, and left-right (difference) on the other, these being decoded on replay. In mono mode, a mono flag is recorded on the cue track which mutes replay of the difference channel. This new recording format is trade marked *Maxtrax* and has special heads with wide face pole pieces to minimise If errors. Pacific Recorders (who are also in the broadcast console market) have discovered that few American broadcasting stations ever receive or despatch cartridges, these being recorded in-house — so there is little reason to stick with the old NAB cartridge format when something better is indeed available, although this argument might not hold with British ILR since commercials are often despatched on cartridge from London direct to the appropriate station. Other features of *Tomcat* include full micro-processor control with infra-red sensors replacing mechanical microswitches, constant current driven rotary solenoid with actuator cam which optimises the motion versus force relationship to rapidly position the pinch roller and then apply the steady state, DC servo capstan motor with 480 slot tachometer disc and 80ms run-up time to eliminate continuous running.

### Consoles

**Allen & Heath** introduced the *Syncon Series B* which 'is an effort to bridge the gap between advanced technology and limited budgets'. Free standing, *Series B* is of the in-line concept and totally modular in construction with the main frame accepting 20 I/O modules with monitoring and masters, while a subframe accepts a further 12 modules. Grouping is 24-track as standard with two mix busses, and the *Series B* can be expanded up to 44/24, with retrofit automation (Allison compatible), and a modular patchbay frame. Each input has a 48V phantom powering with a separate line input with variable gain, tape monitor input with its own linear fader, pan and pfl, record/remix group with or without master fader, in-place 12 segment LED VU meter, eq section with two overlapping sweep equalisers and separate lo cut filters, independent fader mute and in-place solo, and four aux mixes with versatile matrix output system. There is a choice of three fader options (including P & G), and *Syncon Series B* comes complete with tinted acrylic meter hood, padded arm rest and solid hardwood side trims.

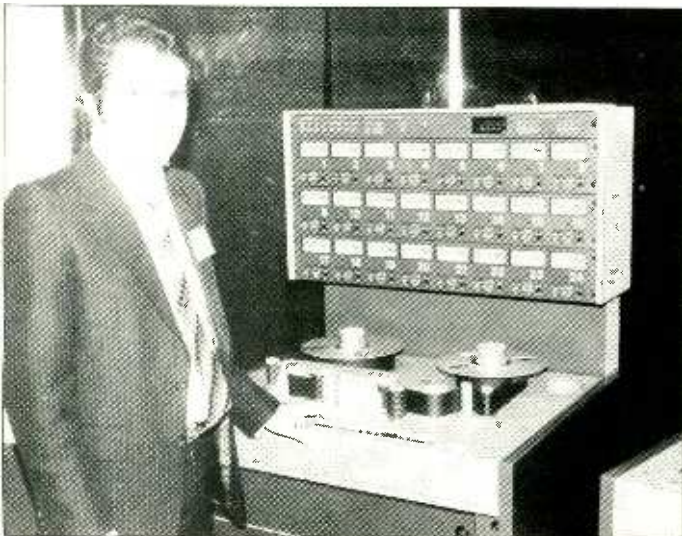
**Biamp Systems Inc** of Portland, were showing a wide range of products including power amplifiers, electronic crossovers, quad limiter, reverb system, and ⅓-octave equalisers, and a range of consoles. The *2442* and *1642* are 24- and 16-channel consoles respectively, each using the same modules and with four submasters and two main outputs. There are four bands of eq, aux, echo and monitor/cue busses, solo, mute, panning and LED -20dB and +8dB indicators. Submasters include four aux inputs for line or echo returns, while the main section also includes meter assignment and main solo. Metering is VU and power supply is external. Biamp also manufacture a range of smaller consoles ranging from 16-input stereo, through 12, 8 and 6 input models.

**Ela Audio** consoles, including the *System 100*, *System 200* and *Concord S2000*, which were fully described in the last AES report, are now being distributed in North America by Audicon Marketing Group in Nashville, together with Barth signal processing equipment, Raindirk consoles, Redwood Research automated projects (see later) and Woelke test and measuring equipment.

53 ►

Neil Hauser and Iain Everington of Allen & Heath with the new *Syncon Series B*

Bruno Hochstrasser of Studer Revox America



# turnkey mix

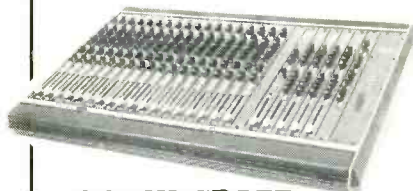
## 24 TRACKS FOR A SONG

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## SOUNDCRAFT UPDATE

The ultimate in eight track has become even better with the introduction of Soundcrafts Series 400 consoles. LED metering, double monitoring, full parametric eq and single cable interface are just some of the remarkable facilities being offered. As main dealers in this country we are offering exclusive packages and installation, call us for details.

## SHORT TAKES

**ADVANCED** Audio Designs appoints Turnkey as exclusive agent for their remarkable digital delay . . . . **PROKIT** 104 budget four track mixer with monitoring available now . . . . **TEAC** poised to challenge the B77 . . . . **PAULINE** Cook, previously of Scenic Sounds joins our sales staff . . . . **MXR** Harmoniser now on demonstration . . . . daily deliveries in the London area . . . . **ECOPATE'S** long high frequency decay proves to be a winner . . . . **ROCKBELT** musos staying home and making hits in their attics . . . .



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## TURNKEY TWO

Andy Munro, previously of Shure and AHB, joins us this month to form TURNKEY TWO. Cost effective acoustic design is the prime objective. Microprocessor aided analysis and design enables system performance to be assessed before installation. In addition to the supply of tailored sound systems, TURNKEY TWO provides a basic control room analysis service, giving studios the facts and means to correct their acoustics.

First projects include a 2kW reinforcement package for the Lakeside Country Club and a complete system for Scotland's National Theatre in Inverness, featuring a novel central cluster speaker array. A £30k PA rig for the Dooley's is nearing completion.

## RADIO BOOM

With the expansion of commercial radio in this country, there has been a great demand for production studios in the last few months, calling for sophisticated installations combining multitrack equipment with classic production facilities. Our experience of broadcast has resulted in fast installations for YAMCO in London and SSK in Glasgow.

## MOLINAIRE TAKE SEVEN



Great British Springs have been supplied to each of the audio post-production studios at the Molinaire complex. Jingles, Audio Sweetening and AV tape compilation are this rapidly moving company's forte.

## SPRING SALE

Some ex-demo, oddball, and slightly damaged items available once only, on a first come, first served basis;

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## 16 ON 1



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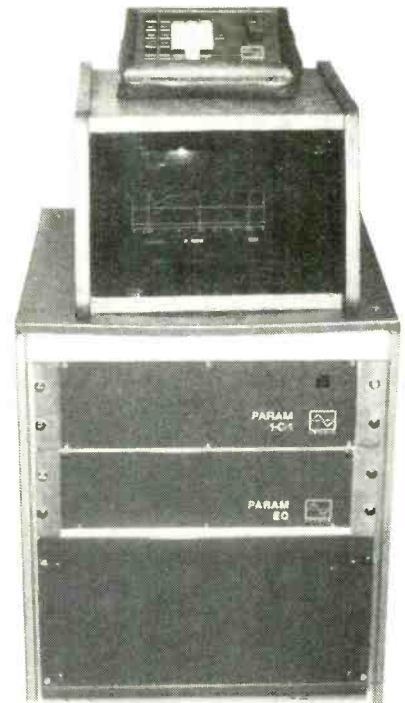
## AES Report

**International Consoles Corp** have developed a completely modular console they term the 'Plug-in Perfection Modular System', and which was shown as a single channel at AES. Each and every function of the console is separated into its own small module, which can be easily replaced or updated as required. The console includes complete memory of all control positions, the control illuminating when the recorded position is matched. Noise gate circuits are associated with the summing amplifiers, cutting non-playing channels from the master electronics. The following modules are available; pre-amp (mic), input selector, track access, signal processor (eq), buss assignment, output assignment, fader (*Fadex*), arm rest, control room, monitor, oscillator, summing amplifier, master logic, push button, master fader, buss (master module) and track (master module). Upon noise specification, the company says 'with all controls set at maximum gain except *Fadex* (set at unity), the thermal noise of a 150 $\Omega$  microphone represents approx 90% of the noise present'.

**Panasonic** entered the semi-pro audio business with a range of equipment including the *Ramsa WR-130 8/2* audio mixer with electronically balanced inputs, two bands of eq, pre-mix and pan pot on each channel, with stereo masters and VU meters.

**Quad-Eight** were demonstrating the *Coronado* disc editor system which records up to 21 minutes per double density floppy computer disc, with up to 32 takes, requiring only a SMPTE timecode track on the multitrack recording. The system includes internal timecode reader and generator, preset editing allowing segments of mixes recorded on either of the two discs to be added, or other sequences to be added. A colour TV display shows the status of the system and provides prompting instructions.

Possibly the most innovative product on show at AES was the new **Redwood Research Inc** *Param* computer assisted parametric equalisation system. This was designed in West Germany by Peter Leunig and is distributed in Europe by R Barth KG and in North America by Audicon Marketing. Basically a centrally programmed computer controlled parametric equaliser system capable of supporting up to 128 channels, each channel comprises six bands whose response is optimised by the 'in-system' computer. The filters are lo and hi with  $\pm 16$ dB at four frequencies, mid 1 and 2 with  $\pm 16$ dB at 16 frequencies, and lo and hi cut of 12dB/octave. But the great difference between conventional



*Redwood Research Param computer assisted parametric equalisation system with television display centre*

parametrics and *Param* is the technique for setting the equalisers. Rather than a multitude of separate controls (often approaching 500 on a large console), *Param* has a simple central control panel with a keypad and joystick, which is used with a television monitor to precisely tailor the required equalisation curve, an arrow being moved across the screen by horizontal movement of the joystick, while vertical movement 'pull or pushes' the curve to gain the desired frequency response. Up to 32 standard equalisations may be stored, with 64 console settings, stored internally (optionally 500 using floppy disc). A compare switch allows the previous and current eq settings to be both enacted and displayed on the screen. Various display modes allow the status of the various equalisers to be examined. Complete systems are available for from four (\$14,000), through 24 (\$34,400) to 48 channels (\$59,000), while the system can be built separately from cards, and options added such as floppy disc storage, channel grouping, autogain setting, and spectrum analyser. A nice touch is that the small, portable central control panel is backed by what can only be described as a leather

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*Bud Bennett of  
Quad-Eight with the  
Coronado console*



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## AES Report

covered beanbag, so that it may be conveniently placed anywhere on the console top, the weight being evenly distributed.

**Raindirk** introduced the *Britannia Series* console, which is an in-line design 40/32 console with master status logic control with PROM controlled signal switching, six band fully parametric equalisation on each input, separate, but interchangeable monitor fader, optional transformerless balanced input, two separate line inputs allowing two multitracks to be connected, overload indicator driven from the output of the equaliser, four cue and three echo sends, solo, mute, slider faders on echo returns, track jump, remix, overdub and record switching, communications module, and 24-track routing as standard or 32 optional. Other options include VCA grouping, Allison *Fadex* automation, and *Param* equalisation.

**Sound Workshop** showed the new *Series 30* recording console which has been designed to implement most of the features and performance of the *Series 1600*, but in a smaller console at lower cost. Although an eight buss console, the *Series 30* is equipped with 8, 16 or 24 discrete output channels determined by the number of inputs ordered. The *Series 30* may be supplied or retrofitted, with VCA subgrouping (using the Allison *EGC-101* gain cell) and *ARMS* automation (MCI compatible). Mic amps are transformerless balanced, while the console is an I/O design allowing a wide range of monitoring capabilities for multitracking. Mainframes are available for 12, 20, 28 or 36 I/O modules, although they may be supplied partially filled. Two types are available, the *Series 30A* with three band three frequency equalisers, long throw carbon faders, two aux busses with an additional buss available for mix-down, and the *Series 30B* which includes sweepable equalisers (20:1), switchable low cut filters, Penny & Giles faders, two echo send busses and one stereo cue buss, fully wired TT-type patch bay.

**Tangent** were exhibiting the *Series 4* four buss console suited for sound reinforcement as well as 4- and 8-track recording, and the *Model 3216* 16-out console with 16 submaster busses.

**Toa Electric** is a Japanese company that produces a wide range of semi-pro equipment

'It's child's play,' says Frank Miller junior of *Sescom*



Bob Wilson of *Allantex Music*, also European co-ordinator for *MXR*

including the *RX-6* and *RX-5* mixing consoles which are 12- and 8-channel consoles respectively, each with two main and two monitor outputs, mounted in travelling cases.

### Disc cutting and playing

**JVC** offers a half speed mastering facility in Japan, using *Adamant* recording styli. These are available in four types for Neumann cutter heads (with a 1 micron tip radius), similar but 3 micron radius, for *Westrex 3D* cutters and finally for *Ortofon* cutters. *Adamant* is distributed by *Master Recording Supply* in Burbank.

**Shure** introduced the *SC39* phono cartridge which is available with biradial or spherical styli, which Shure call *MASAR* (minimum asperity for abrasion resistance) and which is claimed to have reduced noise levels after several plays of a disc, compared with 'ordinary' styli.

**Sontec** offers the *Compudisk CD-80* lathe control system which is retrofittable to most Neumann and Scully lathes, and which provides highly repeatable pitch/depth functions with accuracy and groove packing 'never before attainable'. A complete new control panel offers news functions and displays, with provision for multiple lathe master-slave systems and half speed operation. Unlike other systems, *Compudisk* operates on a principle of land control rather than pitch control. It's all rather complicated to explain, but *Sontec* will doubtless be pleased to forward the appropriate explanation to enquirers.



Peter Gallen of *Design Electronics* with the *Cuemix* foldback system

### Signal processing

**Audicon** were exhibiting the range of *Barth* signal processing equipment including the *Musi-Coder* 'music optimised vocoder', *Audios* digital delay and pitch change processor, *Dynaset* dual limiter/compressor/expander, and the *DIN* module rack which accepts 10 *DIN* type modules, such as *Barth* parametric equalisers, *Dynaset*, phase correlation meter and *PPM* level meter modules.

**dbx** introduced the *900 series* modular signal processing system which comprises a 5½in high rack accepting up to eight signal processing modules including the *901* noise gate, *902* de-esser, and *903* compressor, with a parametric equaliser and phaser module to come shortly.

**Furman Sound** introduced a new tunable 3-way/5-way crossover *Model TX-4* with four crossover points independently tuned to any frequency from 20Hz to 20kHz. The *RV-1* reverb system has also been upgraded to have triple springs.

**Lexicon** introduced the *Model 122 Series* digital delay systems which is a successor to the *102 series*. It uses a 14-bit floating point digital encoding with 6dB gain steps, 9-pole Butterworth filters on inputs and outputs for flat response free from aliasing, and is available in mono or stereo versions, the former having up to five outputs with delays from 40ms to 320ms, the latter one or two outputs per channel with delays up to 160ms.

A VCO module provides a wide range of special time domain effects such as flanging, automatic double and triple tracking, vibrato and tremolo effects, precedence effect panning and dynamic pitch modulation.

**Marshall Electronic** introduced the new *Model 5402 Time Modulator* which has delay capabilities to 400ms without compromising the short delay functions of the original *Time Modulator*. The 72:1 sweep range is not compromised with claimed full 15kHz bandpass and the 95dB dynamic range at all delay settings.

**Studio Technology Inc** (previously **Programmed Technologies**) showed the 'space saver' *Ecoplate II* designed by Jim Cunningham. This uses transformerless unbalanced inputs and outputs and several innovative design changes, allowing the 68×43×10in plate to be offered for only \$2,500, half the cost of the larger *Ecoplate*.

### Microphones and stands

**PZM** microphones were mentioned in last year's Los Angeles report, but this year are now being distributed by **Crown International**. As the blurb says, '... an unusual, different microphone concept for use in recording, broadcasting and



# SYNCON

## Logic and Music in Harmony

It is a fact that many medium priced consoles use ungraded VCAs and ICs resulting in signal degradation and unpredictable performance. Syncon uses top quality discrete circuitry on interchangeable cards which allow not only instant replacement but future upgrading.

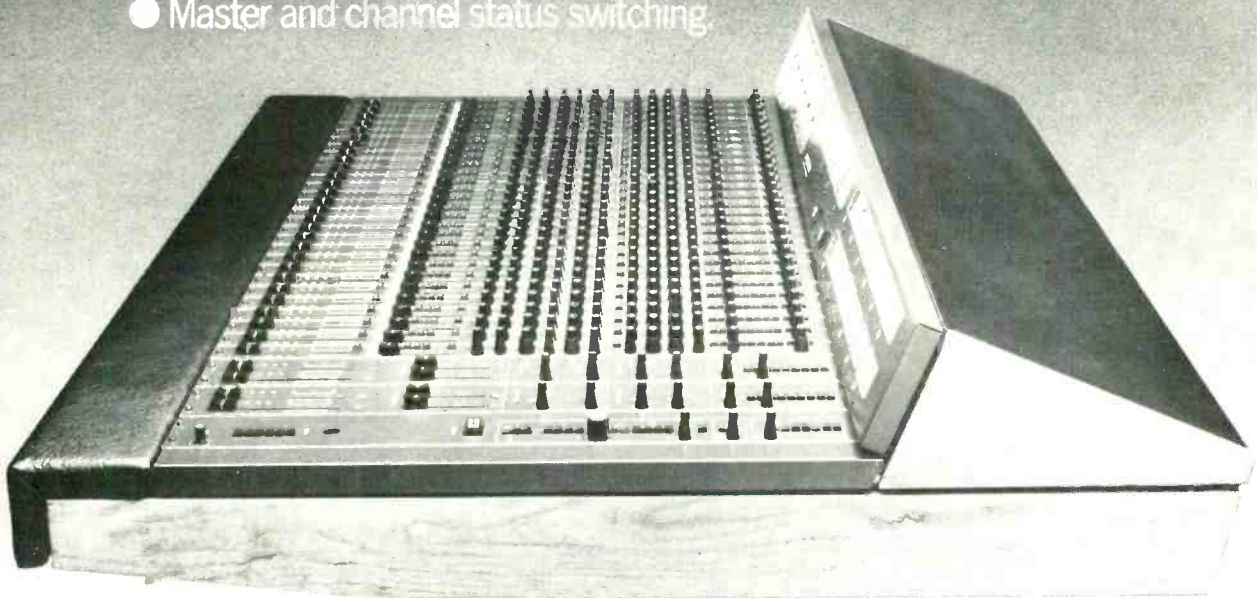
Sophisticated PCB design has virtually eliminated hardwiring making Syncon not

only cost effective but incredibly reliable and serviceable, an important factor for studios without resident 'boffins'.

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## AES Report

sound reinforcement'. Physically, *PZM* mics are a square of metal (which should preferably be mounted on an even larger flat area, up to 4ft square), with a block stuck on top. It is based on the theory that as a soundwave approaches a rigid surface or acoustic boundary, a 'pressure zone' is created within a few millimetres of the boundary, and by placing a pressure calibrated transducer within that boundary, as has been done in the Crown *PZMicrophone*, you gain several advantages over existing microphones. For instance it will reproduce sounds up to 150dB spl without distorting and comb filtering is eliminated with no anomalies caused by phase cancellation. It's something *Studio Sound* will obviously have to investigate further.

**Shure** introduced the *SM63* omnidirectional dynamic microphone which is a compact handheld lightweight microphone for vocal applications, with a shock mounted capsule to eliminate mechanical noise. It has good sensitivity (6dB more than the *SM61*), and a hum bucking coil to reduce strong magnetic fields.

**Matthews Studio Equipment** manufacture a range of professional long reach pro-stands, available in a number of different types ranging from the *Studio Stand* with 112in reach to the wheel mounted *High Roller* with a maximum height of 266in (over 22ft). A Short Boom Arm (72in) may also be added, together with a number of other accessories.

### Amplifiers and monitors

A large number of companies were showing and introducing new amplifiers at AES, but since they are all included in this month's survey, it seems pointless to go into detail here except to list some of those present: AB Systems, Advanced Technology Design Corp, BGW, Biamp, Crest, Crown, Panasonic (Ramsa), Raindirk (FET power amp), UREI (new dual power amp).

**Barco** introduced a new range of professional monitors designed and built in Belgium, there being three models ranging from 30 to 60 litres, with power handling from 45 to 140W. After manufacture, each monitor is checked in anechoic conditions.

**Bose** were showing the *Model 802* loudspeaker system which utilises a multiple array of matched dull range drivers, their close acoustical coupling resulting in a smoothing and broadening of individual driver resonances, producing a 'usually transparent and detailed sound'. The full range driver concept also eliminates the need for a crossover, while the eight drivers have dual reactive air columns which greatly increases the bass output while lowering distortion by reducing cone excursion at low frequencies. Power handling is 160W continuous, with a recommended amplifier power of 300W.

**Kef** were demonstrating the *Model 105 Series II* monitor which is the result of combining subjective evaluations with objective standards. It is a 3-way system with the mid and hi units mounted in a separate 8.5 litre enclosure above the 70 litre lf enclosure, the combination chosen to give a flat and even response both on and off axis, while there is minimum inter-unit delay. The *Model 105 Series II* is protected from overload by a self powered electronic circuit (S-STOP), and can handle 200W.

**JBL** introduced the *Cabaret series* claimed to 'take some of the work out of being a working musician'. This range of monitors is designed for specific applications on the stage, rather than a



Barry Lampden and Martin Parmiter of Industrial Tape Applications with the Ilam 1610

single all-purpose system 'having to do'. The *Cabaret series* includes *4602 Monitor* wide response wedge shaped enclosure, *4621 Lead Guitar* with a 15in extended range loudspeaker mounted in a standard enclosure, *4622 Lead Guitar* with two 12in loudspeakers, *4623 Acoustic Guitar/Vocal Reinforcement* which adds a high frequency ring radiator to the *4621*, *4625 Bass Guitar* with a 15in low frequency unit in a carefully designed enclosure, *4627 Keyboard* with wide response from 15in and high frequency power pack components, and *4680 Line Array* housed in a *Cabaret series* enclosure.

**RWO/Fostex** introduced a range of three *Laboratory Series Monitors*, each with common high frequency arrays, but with different low frequency transducers and enclosures. The *LS/3* has a 15in lf driver in a 250 litre enclosure, the *LS/2* a 12in lf driver in a 76 litre cabinet, while the *LS/4* is a 4-way design with a 12in mf driver and twin 15in lf drivers in a 668 litre enclosure. The high frequency array comprises uhf and hf transducers critically mounted to obtain coherent time/phase system response.

Following the *Super Red Monitor* **Tannoy** introduced its smaller brother, the *Little Red*. While the *Super Red* uses a 15in dual concentric unit, the *Little Red* has a similar 12in unit, to maintain the single point sound source. Recommended power is 100W minimum, with an enclosure volume of 46.5 litres, while a calibrated control network provides adjustment of the amplitude response. Tannoy products are now distributed in America by amplifier manufacturer BGW.

### Synthesisers

Perhaps the most notable aspect of this AES was the number of companies demonstrating digitally controlled synthesisers for the first time. Some had been seen at other shows, but all made their introduction at an AES.

**Con Brio** introduced its second generation digital musical synthesiser, the *ADS200*. This combines all the features of the earlier *ADS100* into an integral console with twin keyboards, computer disc drives, video monitor and command console. The *ADS200* includes synthesis using conventional ADSR analogue controls or by specifying complex 16 segment envelopes, with six waveforms available for synthesis, with several synthesis modes (additive, phase modulation, frequency modulation, nested phase and frequency modulation etc), all of which may be stored on floppy disc.

**Digital Keyboards Inc**, Garden City, showed

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AMCRON 

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Should the power transformer begin to overheat, an output transistor fail, or a short circuit occur, then the amplifier will automatically shut down to its 'stand-by' mode without damage to itself or to external equipment.

The protection circuitry also safeguards the PSA-2 against 'chain destruction' and damage caused by mis-matched loads.

As Dr. Mark Sawicki observed in his

review of the PSA-2:

"When reading reports of systems used by The Who, McCartney and Genesis...the Amcron name appears frequently...Why?

Well, reliability and outstanding performance are the answers.

Overall, the performance of the PSA-2 amplifier...is excellent."

Now. Given that you're spending a lot of money on a power amplifier (arguably the most crucial piece of equipment in your system), doesn't it make sense to

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more on a unit which is virtually disaster-proof? We think so.

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**Equaliser £31.97** uses the latest parametric design over two bands, enabling the boost and cut circuits to be tuned to any spot frequency. Input 0dBm at 10kohms. Output 0dBm into 600ohms. T.H.D. less than 0.1%. Bass + or -16dBm at 50/300Hz. Treble + or -16dB at 3/14kHz. Noise less than -80dBm.

**Reverberation £33.12** a custom made spring unit and variable tone control circuitry ensure a natural sound. Input from -30dBm at 33kohms. Output from 0dBm into 600ohms. Decay 3.5seconds. Noise less than -58dBm. Mix Continuously variable. E.Q. Bass/treble balance.

**Booster £33.12** unique switching systems give the option of use as four separate line drivers or as a distribution amplifier, with balanced or unbalanced outputs. Input 0dBm or -10dBm switched at 47kohm single, 12kohm mult. Output 0dBm unbalanced, +6dBm balanced to drive down to 600ohms. T.H.D. less than 0.1%. Noise less than -80dBm.

**Compander £34.27** up to 30dB of noise reduction for both stereo and multitrack recording is possible - simultaneous operation. Input/Output from -10dBm to +4dBm. Dynamic Range up to 100dB. Ratio 2:1.

**Power Supply £28.52** the optional mains supply is housed in a standard ACCESSIT case and has independent outputs for up to four processors. Input 240 Volts 50/60Hz. Output 24V DC 200mA. Ground Negative reference. Ripple less than 200uV. Regulator Power I.C. type. Size 142 x 132 x 43mm.

**RacKit £19.55** Three Accessit processors may be mounted to a standard 19" rack to create dedicated units.

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## Accessit

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## AES Report

the *Crumar General Development System (GDS)* that comprises three parts: a Z80 based general purpose computer system, musician oriented input devices such as a velocity detecting keyboard, sliders, pots, etc, and 32 completely programmed digital oscillators and patching networks.

The **Fairlight CMI** (Computer Musical Instrument) is manufactured in Australia and distributed in America by International Sound in West L.A. and in Britain by Syco Systems Ltd in Bath. Again, using twin keyboards and a visual display unit, this unit is unique in that a light pen is used on the TV screen to operate many functions, easing operation. The CMI can also sample natural sounds (from say a mic) and manipulate these in various ways, and is up to eight note polyphonic with complex sequencing facilities and floppy disc storage.

**New England Digital Corp.**, Vermont, introduced the *Synclavier II* synthesiser which is a truly portable digital system without VDU, and which is available with 8, 16, 24 or 32 voices (128 to special order) with a unique new partial timbre method of synthesis to create sounds claimed to be virtually undetectable from real instruments. Designed for live performance, *Synclavier* includes two foot pedals, six foot switches, a ribbon controller and optional velocity sensitive keyboard.

**Musico** introduced *Resynator*, an instrument controlled synthesiser which takes any instrument and makes it sound like something else. Two microcomputers analyse which note is being played, and how it is being played, and then construct a sound and shape totally dependent upon those analysed parameters. It uses eight wave shapes to dynamically shape the selected sound and has separate front panel sections labelled 'select a sound' and 'select a shape', with additional foot switches. UK distribution is from Scenic Sounds Equipment.

### Other lines

**Alpha Audio** were showing *Sonex* acoustic foam, a sculptured acoustical open cell foam with uniform and highly effective absorption characteristics, of wedge design. It is available in blue, yellow and brown, with custom painted colours also to order, in depths of 2, 3 or 4in and 15in of 4ft square sizes.

**Ashly Audio** showed a prototype full octave analyser using an external television set for display, with a built-in pink noise generator and phantom powering for the microphone. The *SC-30* measures octaves from 32Hz to 16kHz and costs only \$399.

**B & B Audio** (Aphex Systems) introduced a new IC voltage controlled attenuator, the *1538*. This claims ultra low noise, 130dB dynamic range, class A circuit for ultra low distortion, wide bandwidth and low cost (\$6 to \$3 depending upon quantity). Pin compatible with its predecessor, it has linear dB/volt control, one half the external parts needed and higher operating voltage.

**Bobadilla Cases** make a wide range of custom travelling cases for medium and heavy duty, with styles suitable for racks, consoles, combos, keyboards, guitars and other instruments.

**BTX** introduced the *Series 50* timecode system comprising a SMPTE generator, reader with digital display, jam sync generator/reader and add-on video character generator. All are rack mounting, but only 1 1/4in high.

**Cal-Switch** (California Switch and Signal) is

based in Gardena of switches, wire and terminal blocks, fuses, closures. One useful item collar available in five color printed with particular information and then heat shrunk into place.

Exhibiting for the first time outside **Canford Audio** showed the *EMO* dual injection box which is suitable for mixer impedances of 200Ω and up with floating outputs, earth lift switches and isolation to 1,500V. Canford distribute coloured microphone twin and multipair cables from Steve Graham Audio Ltd, and manufacture a wide range of studio accessories such as studio tables, acoustic script lecterns, studio illuminated signs and an automatic cable tester.

**CB Electronics** is a small British company concentrating in custom design and manufacture of audio equipment, and also exhibiting for the first time in America. In addition, CB offers tape electronics that may be used with existing multitrack transports, or with the CB 2in transport.

**Coherent Communications** showed a wide range of products including the *MX-90* motion picture location sound mixer with four switchable mic/line input channels, single master, headphone monitoring, VU meter, XLR connectors and internal batteries.

**Penny & Giles** introduced the *1000 series* fader, a low cost compact unit with a linear stroke of 90mm with the same tracks and feelers as standard P & G faders, but simplified mechanics. Designed for back mounting, it may be specified with single or twin channels, as linear or audio taper, or with VCA laws to special order. Also introduced was a new digital fader to standard track stroke and with an 8-bit digital output.

**3M** introduced a new *Scotch* audio mastering tape, *226/227*. Designed for critical audio mastering, *226* (1.5mil) and *227* (1mil), offer improved signal to noise and signal print performance over standard low noise oxide mastering tapes, while bias and equalisation is compatible with *Scotch 206*. They are available in 1/4, 1/2, 1 and 2in widths. A textured, controlled wind back treatment prevents high speed wind scatter and provides better capstan grip.

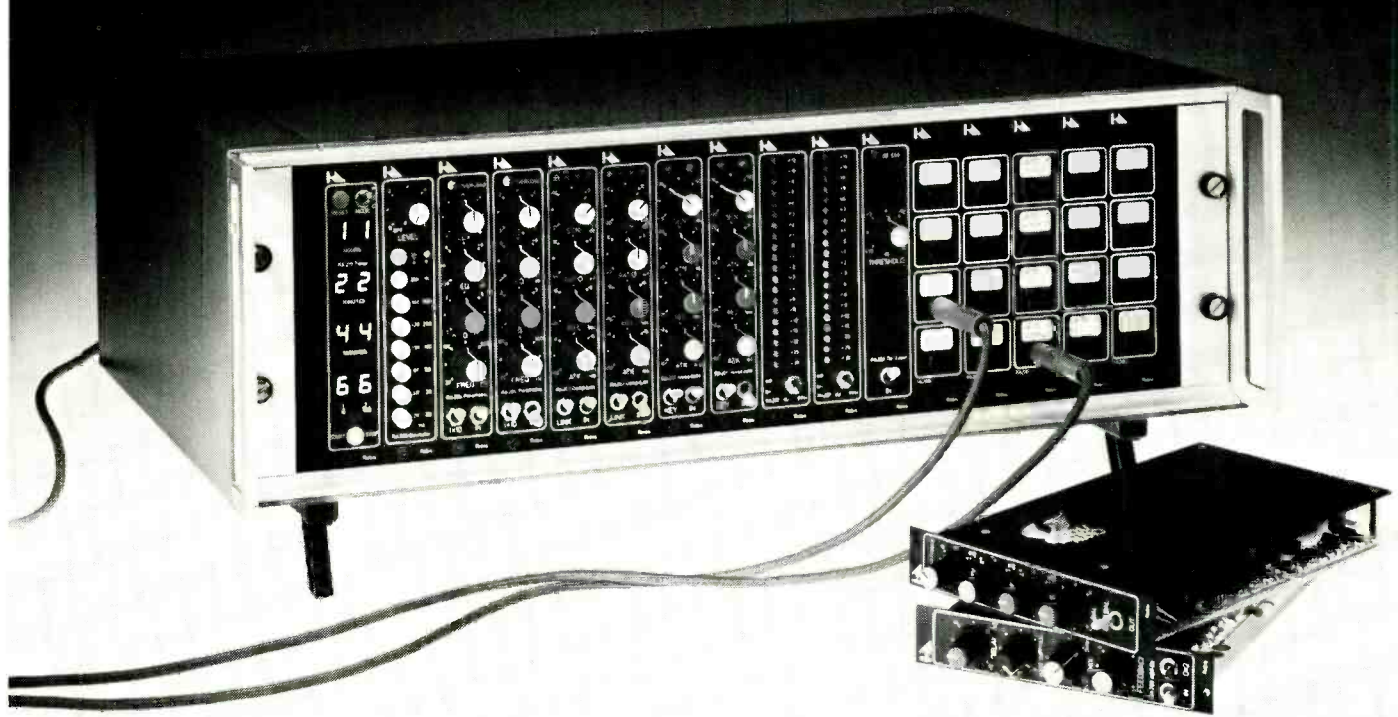
**UREI** once again widened its field of operation with the introduction of two direct boxes, one active the other passive. *Model 325* is active and has a high impedance FET amplifier to avoid instrument loading with an active balanced transformerless output with 3-way ground lift and a 'hot amp' indicator to warn 'hands off'. In addition lf and hf filters are fitted, while the box is battery powered. The *Model 315* is passive with the same filters but provides a balanced transformer output at mic level, again with a ground lift switch.

The newly instituted merger between Allison Research and Valley Audio, **Valley People**, produced easily the best presented literature pack at the convention, covering consultancy services, and the wide Allison range of products.

**Wireworks** manufacture a wide range of multiboxes and multicables, and have produced a poster showing 12 separate applications of their cabling products, illustrating how the various components may be used in applications ranging from stage, sound reinforcement, through to television studios, and which should assist in providing some understanding of these often complex cabling jobs.

And that's it for this convention, the next is New York for four days from October 31. See you there. ■

# Rebis RA200 Series



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# VCA Reviews~ the manufacturers' replies

As expected, we have received letters of reply from the manufacturers of the voltage controlled amplifiers/attenuators reviewed in June 'Studio Sound'.

## B & B

Dear Sir, Thank you for reviewing our electronic gain control device. In response we would like to offer two specific comments: 1) we no longer manufacture the VCA 202 module which, as your fig 3 shows, does not exhibit a dB-linear control characteristic without additional circuitry; 2) the VCA 500A which you characterised is a production item which has been specifically tailored for use in MCI 500 series consoles. These consoles have an attenuation control law of 8dB/V which, as your fig 5 shows, is the precise characteristic of this product. Comparison of fig 3 and 5 shows that the 500A card exhibits a dB linear control law as do all of our current VCA products.

The audio specifications seem to be in order and they denote a sonic performance of which we are proud.

Yours faithfully, Harvey Rubens, Aphex Systems Ltd.

## Allison

Dear Sir, The following are my comments regarding your review of VCAs in the June 80 issue.

I appreciate the time and information restraints under which Hugh Ford conducted the evaluation, and agree with him that the review was somewhat less than complete. Unfortunately the review was, in my opinion, inaccurate in certain respects and in error in others.

Of particular concern to me, and to Allison Research (now Valley People Inc) is the gross error which was made in comparing my product (the EGC series VCA) to the dbx 2001 device. Although the specifications for the EGC 205M were listed correctly, and showed a gain control range extending to +50dB amplification, the EGC 205M was listed as a voltage controlled attenuator (VCA) rather than the correct term 'voltage controlled amplifier' (VCA). In the text of the dbx 2001 section, the statement was made 'as opposed to the other voltage controlled attenuators reviewed here, the dbx 2001 may also be used as a voltage controlled amplifier thus providing an enormous gain control range of 160dB'.

I am led to believe that, perhaps due to the time pressures of the reviews, that less adequate precautions were made by Mr. Ford, in the isolation of input, output and control circuits, in the making of measurements of the EGC 205M. I say this primarily in view of his observed departure from a true dB/volt control relationship at the higher attenuations (ie -100dB). I am fully confident that if he were to remeasure the sample under more exacting conditions, it would be found that an exact dB/volt response exists over the full range of from -100dB attenuation, to +50dB gain, with no more than 2dB error at the extreme ends of this range, rising to a 3dB error at 10kHz at the -100dB attenuation point. The very minor

departure I have given is a result of the crosstalk between the two sections of the op-amp employed in the EGC 205M assembly. The EGC 101 gain cell, itself, when configured with separate input and output op-amps, is capable of following a precise dB/volt control relationship over a total gain range of plus and minus 140dB, for a total of 280dB! This, of course, sounds preposterous, and as one might guess is limited by real world consideration. At the attenuation end, the usable range is limited by stray capacities in the layout to around 130dB at low frequencies, and around 100dB at 20kHz. Since -120dB signal levels are lower than the device residual noise, narrow band filters must be employed to separate signal from noise, if one attempts to measure these orders of attenuation. On the high frequency end of the gain spectrum, the choice of op-amps used will limit the obtainable maximum gain to the area of +50dB for common monolithic op-amps, on up to around 70dB gain with very high precision amplifiers. This, of course, is academic, as VCA gains over 50dB find rare application in the real world.

As for distortion, although Mr Ford's conclusions indicated excellent performance, the conclusions of more exacting tests, again being conscious of separating signal products from residual noise, would show considerably lower numbers, particularly at the nominal signal levels where 0.001% is more representative of the real performance.

In conclusion, I would have to agree with Hugh Ford that there are many possible areas of VCA performance which are not widely known, and which may have influence on the suitability for professional service. As for his suspicion that there may be differences in the VCAs ability to hold the control voltage/attenuation/gain relationship, and that there may be undesirable differences between units of the same make and type, I can state with the fullest confidence that this is not the case with the Allison EGC series. With regard to Hugh Ford's problem in obtaining descriptive literature for the devices, I would offer on behalf of my European agent my apologies for not providing him with the very complete EGC 101 Engineering Data which should have been provided to him. I enclose a copy of same with this letter.

Yours faithfully, Paul C Buff, Allison Research Inc, Nashville, Tennessee, USA.

## dbx

Dear Sir, Thank you for giving dbx the opportunity to comment on Hugh Ford's VCA review in the June 1980 issue of Studio Sound. We would like to commend you on the manner in which the information was presented. It is interesting to note that while we have chosen to maintain an objective perspective with regard to the great distortion fight it is indeed gratifying to read that Mr Ford concurs

that there is little substance to this controversy. There are, however, a few minor points raised to which we would like to respond.

It is noted on page 98 that the 2001 VCA is the only true VCA, the other being classified as attenuators as opposed to amplifiers. This is incorrect. The Allison EGC-205M (manufactured under dbx patent number 3,714,462) is also capable of gain.

While it is indeed easy to modify the 2001 performance for alternative control port sensitivities, this is best accomplished via a separate op-amp gain of loss stage, so that the control port will cause slightly increased distortion figures due to stray signal pick-up.

Mr Ford's measurements of frequency response, overshoot and ringing on square waves, noise at maximum attenuation, and twin tone IM distortion are controlled by the output op-amp and compensation rather than by the 2001 itself. The 2001 is a self contained current-in, current-out VCA. However, while the input current may be obtained by simply using a resistor to convert voltage to current, the output must 'see' a low impedance to ground for proper operation. As Mr. Ford describes, this circuit usually involves an operational amplifier with its inverting input directly connected to the 2001 output. The op-amp feedback loop must be completed by the parallel combination of a resistor (which, with the op-amp, will provide the current-to-voltage conversion desired), and a small capacitor (which provides proper frequency compensation for stability). The capacitor chosen plays an important role in the frequency response and ringing Mr Ford discusses.

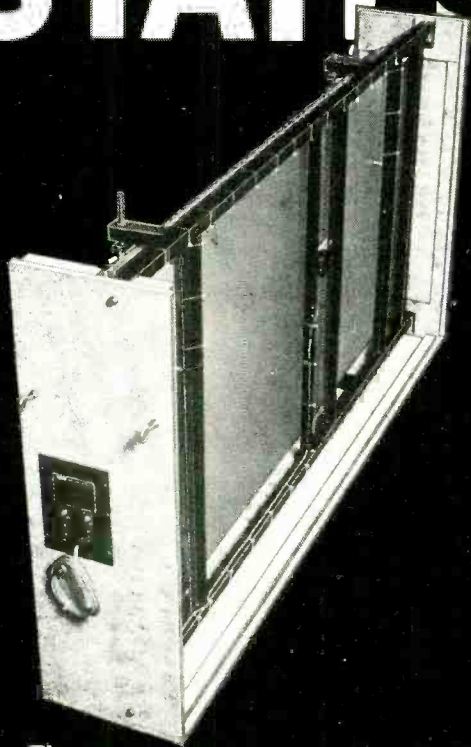
The entire system of VCA, output amplifier, and feedback network forms a two pole active filter. It can be under, over, or critically-damped, therefore producing overshoots, undershoots, or correct exponential response. Fig 8 on page 98 shows a rise of a few tenths of a dB in frequency response at 95kHz for unity gain operation. This rise indicates that the feedback capacitor was too small to provide critical damping, thereby causing the peak in response and the overshoot and ringing noted with fast square wave inputs. Increasing the capacitor slightly would eliminate overshoot and ringing while flattening the response peak.

The output noise level measured at unity gain accurately reflects the 2001 noise contribution, however, the -100dBm figure obtained at maximum attenuation is only a measurement of the output amplifier's own noise.

We also agree with Mr Ford that the IM distortion rise he noted above 8kHz was most likely caused by the output op-amp used, not by the 2001. When the device under test comes as close to the ideal 'straight wire with variable gain' as the 2001, it is often hard to sort out the imperfections in the test equipment from the imperfections in the VCA.

In a similar vein, the attenuation differences

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# letters

## Screening and earthing

Dear Sir, As a long standing mobile unit (Rolling Stones) a great deal of our work involves recording bands 'live'. In the course of our work we meet many other organisations working to the same ends — getting clean sounds efficiently.

The basis of this letter is to raise again the question of standardisation of XLR connectors, not which pin is hot and which is screen, but what to do with the case.

If everybody uses pin one as ground and a phase problem exists then it is easy to get a reverser for pins two and three. But lifting the ground from equipment cases is more difficult. Taking for instance a standard DI box consisting of a hi in/lo out transformer. The input and output jacks (linked single pole devices) are bridged by the transformer primary, the secondary going to pins two and three of the XLR. It is usually recommended that a switch be supplied to link pin one of the XLR to the input ground or to isolate it. This is usually housed in a metal box for screening and durability purposes and one or other of these grounds needs to be connected to the box to provide a screening potential. The trouble starts when the grounds become linked. This situation will occur when the box is grounded by its input earth and pin one of the XLR is isolated. But the grounds meet via the XLR cases if the female plug on the lead has pin one shorted to its case. If an earth loop exists

because of this, then no matter how much fiddling is done with the earth switch on the box the situation will persist. If, in the previous situation, the box was earthed via pin one of the XLR but the jacks are isolated, then no problem until the box touches a piece of grounded stage equipment eg an amp chassis.

There are numerous times when equipment on stage needs to be inter-connected for all the various feeds that need to be supplied and being very aware of this, as any strange noise is invariably the 'fault' of the mobile, I have tried to realise a general way around this problem. I am not aware of a norm existing for the wiring of XLR cases so if this is the situation, then I would like to suggest that the case of all cable female XLRs be isolated; males being connected to the cable screen, and the cases of all chassis mounted units being continuous. This would be perfectly safe because the grounding will follow through. In providing a DI feed of a split, the cable mounted female case will be grounded via the chassis mounted male and the screen switchable. A microphone case would be properly earthed because case and pin one are linked internally. Wiring this way also has the advantage of ensuring the screening of lead junctions where a number of leads are linked together. Making this linked case on the male plug of a type that does not have a tag for it can be a little tricky and the easiest thing to do might be to change the unit for

a type on which this facility is provided.

These ideas may be of more relevance to PA companies and mobiles than to fixed site studios, but I am sure that to have some conformity would not be a bad thing and I would appreciate knowing other people's views on the matter.

Yours faithfully, Mick McKenna, The Mobile Studio Limited, 2 Munro Terrace, London SW10 0DL.

## London AES

Dear Sir, I sincerely hope that next time the AES Convention/Exhibition is held in London, it will not be at the Park Lane Hotel. Our stand was at the end of a dark corridor but others were much less fortunate, tucked away in corners behind large Victorian chairs.

In my humble opinion, the Park Lane Hotel part of the exhibition was an absolute shambles. In fact, it was the worst exhibition I have ever participated in during the past sixteen years.

Yours sincerely, P J Eardley, Chairman, Eardley Group of Companies, Eardley House, 182/4 Campden Hill Road, Kensington, London W8 7AS.

## Ecoplate review

Dear Sir, When we submitted our Ecoplate to Hugh Ford for review in Studio Sound, it was with some trepidation, knowing Hugh's uncompromising and penetrating reviews. We have duly noted the negative comments about the Ecoplate and are taking steps to correct them in future. There are several comments of Hugh's however, that indicate we did not properly communicate some of the unusual design characteristics.

First, the 'loose screws' are actually part of a suspension to keep the transformer lamination buzz from getting into the system; they are held by stopnuts. Second, the Ecoplate amplifier is supplied in England without a mains plug, so the fuse being neutral line was not a factory error. Third, Hugh comments that the Ecoplate amplifier can be overloaded if both of the summed inputs are driven. This would never occur in practice, however, since any reverb unit is fed from a mixing desk echo buss. The purpose of the extra input is for those mixers who like to use another echo buss with delay for selected instruments or voices. In either case, there can be no additive effect. Fourth, because of the extremely high input impedance of the pickups, a special grounding technique was employed which does not allow the shorting of both inputs as Hugh did in his test. This was probably the cause of the hum which showed up in Hugh's measurements. With the pickups plugged in there is no hum in the Ecoplate.

Lastly, Hugh comments that he prefers a 'natural' decay for classical music. Actually, the 'flat' decay of the Ecoplate was designed with the help of the USA's leading pop music mixers. They had complained to us that they couldn't get rid of the 'boom' in the plates they were using by equalisation alone. As Hugh said, the decay is a matter of personal taste, and since the Ecoplate is in use in major studios throughout the world than any plate except the famous original, we feel that the makers of pop music, at least, are leaning in our direction.

Yours faithfully, James C Cunningham, Programming Technologies Inc, 6666 North Lincoln Avenue, Lincolnwood, Illinois 60465, USA. ■

## VCA Reviews-replies

noted at 1kHz and 20kHz are almost certainly caused by the lead dress of the test fixture used. At 20kHz it is difficult to keep stray capacitances low enough to provide the greater than 95dB attenuation of which the 2001 is capable at 20kHz.

The dbx 2001 specifications (page 92) state a gain control range of -100dB to +60dB, and a control constant of -20dB/V (unlike the other products reviewed, which were all -10dB/V). This is equivalent to a control voltage range of +5V to -3V. Mr Ford indicates that in order to determine the output offset voltage variation with control voltage (control voltage feedthrough) he exercised the control port over a 10V range. It is not clear whether this range was from 0V to +10V, or perhaps -5V to +5V. It is clear that +10V, was applied to the control port in determining the maximum available attenuation. It is here that we part company with Mr Ford's measurement method. 10V control range is 2V to 5V beyond the maximum allowed. In particular, at +10V on the control port, we would expect the 2001 to generate large offsets at its output.

Over the specified gain range of -100 to +60dB, the offset voltage change will be less than 20mV as specified. Normal usage of -100 to +30dB will result in typical offset voltage changes of less than 5mV. Asking for 200dB attenuation (at +10V) at best is impractical, and could possibly cause damage to the device.

As Mr Ford admits, accurate comparisons among VCAs are very hard to make, especially because circuit configurations vary among manufacturers and often within a manufacturer's own product line. dbx has prepared technical notes available on request to assist users in connecting the 2001 in various applications. These notes in-

clude a discussion of specifications and their ramifications as applied to audio.

Yours faithfully, Lawrence Jaffe and Leslie Tyler, dbx Inc, Newton, Mass 02195, USA.

## Hugh Ford replies

I am grateful to Paul Buff, Harvey Rubens, Lawrence Jaffe and Leslie Tyler for their comments upon the reviews which appear in June Studio Sound and apologise to Paul for the omission of the fact that his Allison type EGC-205M has an available gain of 50dB—this was a serious oversight on my part. However, I would refer readers to my overall summary at the end of the reviews and reiterate the first paragraph of the summary as follows: 'Unfortunately these reviews are not nearly as comprehensive as I would have liked them to be because of the great difficulty in obtaining information about individual VCAs'.

To deal briefly with some of these further points raised, I did not criticise the Allison unit for not adhering to the nominal dB/V characteristic. While all the plots of dB/V lines show a curvature at very high attenuation, these most certainly particularly contributed to the difficulty of eliminating measurement errors. Personally I do not consider that dB/V characteristic errors are of great significance at high attenuation, however, it is at higher levels where matching of dB/V curves between individual VCAs is critical.

Again, considering harmonic distortion I measured individual harmonics at various signal levels with a measurement capability down to about 0.03% at all levels. Paul's figure of 0.001% total harmonic distortion can only be measured at high signal levels to avoid the effect of noise and I believe it is most important to measure distortion at all significant signal levels as with many devices distortion increases as the signal level is lowered. I doubt if anyone can hear the difference between 0.001% and 0.03% harmonic distortion!



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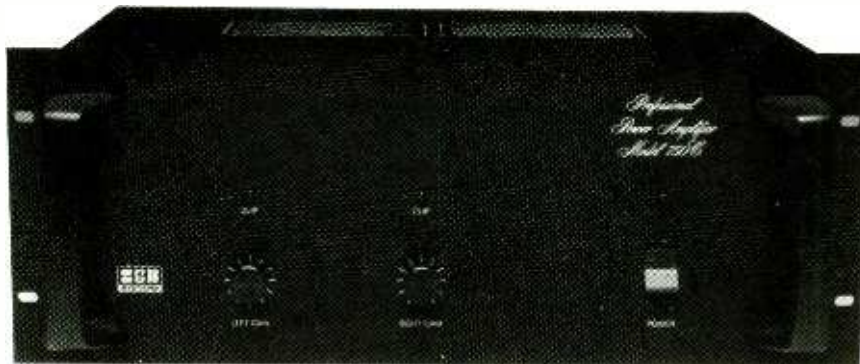
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## BGW 750C amplifier



### MANUFACTURER'S SPECIFICATION

**Output Power:** 225W minimum sine wave continuous average power output per channel with both channels driving 8Ω loads over a power band from 20Hz to 20kHz. The maximum total harmonic distortion at any power level from 250mW to 225W shall be no more than 0.1%. 1kHz power: 240W into 8Ω per channel, both channels operating, 0.1% total harmonic distortion. 360W minimum sine wave continuous average power output per channel with both channels driving 4Ω loads over a power band from 20Hz to 20kHz. The maximum total harmonic distortion at any power level from 250mW to 360W shall be no more than 0.2%. 1kHz power: 400W into 4Ω per channel, both channels operating, 0.2% total harmonic distortion. 720W minimum sine wave continuous average power output monaural driving an 8Ω load over a power band from 20Hz to 20kHz. The maximum total harmonic distortion at any power level from 250mW to 720W shall be no more than 0.2%. 1kHz power: 800W into 8Ω, 0.2% total harmonic distortion.

**Intermodulation distortion:** less than 0.02% from 250mW to rated power.

**Small signal frequency response:** +0, -3dB, 1Hz to 90kHz; +0, -0.25dB, 20Hz to 20kHz.

**Hum and noise level:** better than 106dB below 225W (unweighted, 20Hz to 20kHz).

**Input sensitivity:** 2.12V for maximum power output. Voltage gain 26dB (20 times).

**Input impedance:** greater than 15kΩ.

**Damping factor:** greater than 230 to 1 referenced to 8Ω at 1kHz.

**Output impedance:** designed for any load impedance equal to or greater than 3.5Ω.

**Power requirements:** interchangeable for either 100, 120, 200, 220 or 240V ac, 50-60Hz 1500W.

**Semiconductor complement:** two Op Amp IC's (equivalent to 44 transistors each), 51 transistors, 5 zener diodes, 19 diodes.

**Dimensions:** 7 × 19in standard rack front panel by 12in deep (177.8 × 482.6 × 304.8mm).

**Weight:** 57lbs (25.9kg) net; 63lbs (28.6kg) shipping.

**Price:** £641.30.

**Manufacturer:** BGW Systems, 13130 South Yukon Avenue, Hawthorne, Cal. 90250, USA.

**UK:** Court Acoustics Limited, 35-39 Britannia Row, London N1 8QH

The BGW model 750C is a high power twin channel amplifier intended for stereo or mono operation in the bridged mode. The unit is intended for rack mounting into a standard 19in rack with the substantial front panel providing mounting holes plus two substantial handles which protect the front panel controls. These consist of a potentiometer gain control for each channel, a magnetic circuit breaker and red LED indicators for power on and for clipping in each channel.

To the rear is a cooling fan (with protective

grid but no filter) with the cooling air passing over the power transistor heatsinks and through the side of the amplifier so that amplifiers may be stacked in a rack.

Two separate inputs are provided for each channel, an unbalanced ¼in jack connection and an XLR connection. The latter may be balanced or unbalanced by means of dummy plugs or input transformers which are inserted into octal sockets adjacent to the input connections. When input transformers are fitted, these are held in place by a screwed clamp plate.

The output terminals are in the form of 4mm socket terminals on the standard ¾in spacing, adjacent to the input connections — something that the hi-fi brigade would not take kindly to? Outputs are protected against turn-on thumps by a relay which also provides protection against any excessive dc offset at the outputs.

A screwdriver operated slide switch on the rear panel allows for either stereo operation or bridged mono operation, there not being any indication of the status at the front panel. Finally at the rear there is a screwdriver fitted link for disconnecting the amplifier ground from the power ground, and a substantial fixed mains power lead which is over 8ft long.

Other than the actual input connections and relay protection board, the electronics of each channel are housed on a single good quality printed circuit board which itself is mounted onto a heatsink covering half the top area of the amplifier. Each amplifier channel may be removed by undoing six screws, two push connectors and an 11-pin plug — excellent for servicing with circuits being provided in the instruction manual. However, no component identifications are to be found on the printed circuit boards and no layout diagrams in the manual.

Each of the massive heatsinks are fitted with two thermostats, one for increasing the cooling fan speed at a given temperature and the other for disconnecting the load if the temperature continues to increase to a dangerous level.

In the base of the amplifier is the large mains transformer and two large electrolytic capacitors with the rectifier using the base as a heatsink. Other than the relay board which is protected by a fuse within the amplifier, protection relies on the magnetic circuit breaker which itself must be changed if the amplifier's operating voltage is changed — typical of earlier BGW amplifiers.

The standard of both mechanical and

electrical construction was found to be excellent but with typical American wiring on the untidy side. However, at this stage I must complain about the mechanical noises from the amplifier. Not only did the mains transformer hum excessively but the fan noise even at low speed was most irritating.

### Power output and distortion

Power output was measured under carefully controlled conditions using a stabilised mains power supply with accurate load resistors and a digital voltmeter to measure the output voltage.

Using a 240V 50Hz supply the output power at the onset of clipping a 1kHz sinewave into 8Ω was virtually identical for both channels irrespective of whether single channels or both were driven, being just over 260W — well above specification. In the case of 4Ω loads there was some difference (as is not unusual) with the output being 440/430W with both channels driven or 465/435W with single channels driven.

When driving 4Ω loads the actual impedance may be considerably less than the nominal 4Ω so the power available at the onset of clipping into 2Ω was examined, being 270/240W for the two channels with single channels driven.

As an indication of the 'music performance', the clipping level of a toneburst of 1kHz with 10ms 'on' and 100ms 'off' was measured into both 8Ω and 4Ω with single channels driven, the results being 305W into 8Ω for both channels and 480/450W with 4Ω loads.

Turning to the distortion performance the bandwidth at half power into 8Ω for less than 0.1% total harmonic distortion was up to 40kHz, or 30kHz using 4Ω loads. Total harmonic distortion at 1W was less than 0.006% at 1kHz into 8Ω, or less than 0.009% into 4Ω with the residual consisting of hum and crossover 'spikes'. At 10kHz into 8Ω at 1W the total harmonic distortion was less than 0.06% taking the form of crossover 'spikes' and varying with the volume control setting with a worst case at 3 o'clock settings when the total harmonic distortion was 0.13% for both channels.

Examination of twin tone CCIF intermodulation performance at 1W output produced **fig 1** which shows that the intermodulation distortion is extremely low below 15kHz rising to a maximum of 0.3% at 100kHz. Similarly at half power the intermodulation distortion remains very low within the audio frequency

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The Furman range includes mono and stereo parametric equalisers with pre-amps, tunable crossover/bandpass filter, and (shown here) the neat reverb system with limiter and equaliser. The simple layout and wide range of control gives full scope for creative engineering at a price which gives great value for money.

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# reviews

range as shown in **fig 2**.

Using a new technique involving an asymmetrical waveform to measure the fifth harmonic distortion showed this to be at a low level within the audio frequency band rising above 20kHz as shown in **fig 3** from which it should be noted that the normal and inverted waveforms gave similar results.

### Frequency response and noise

The overall frequency response of the amplifier at 1W output is shown in **fig 4** which shows the amplifier to be adequately flat within the audio band, with the response sensibly rolling off rapidly at 100kHz (-3dB).

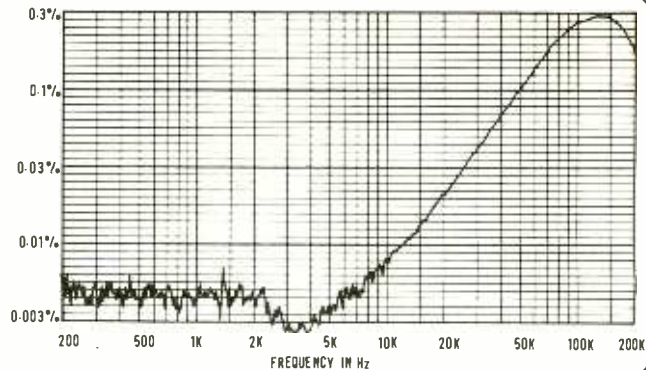
So far as noise is concerned, there was a significant difference between the two channels in some measurements due to power line hum and its harmonics, which are reduced in effect when measuring weighted noise. the performance relative to the rated 225W into 8Ω being as shown in **Table 1**.

### Inputs and Outputs

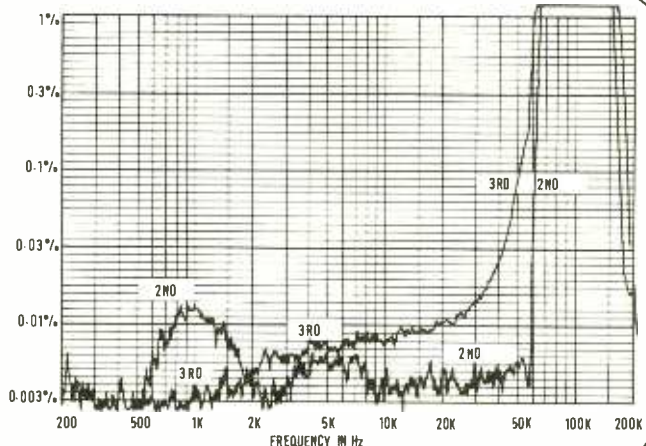
The input sensitivity of the two channels was almost identical being 2.2mV and 2.22mV to drive 240W into 8Ω at 1kHz using the unbalanced input. With input transformers fitted, sensitivity for the same output became 1.1V with a floating input.

Relatively mild input impedance variations occurred with changes in the level control settings, with the unbalanced input changing from 13.7kΩ at maximum sensitivity to 19.6kΩ

**FIG.1**  
BGW 750C TWIN  
TONE INTERMODULATION  
AT 1W



**FIG.2**  
BGW 750C TWIN TONE  
INTERMODULATION  
PERFORMANCE AT  
HALF POWER



**TABLE 1**

Measurement method

Band limited 22Hz to 22kHz rms

A weighted rms

CCIR weighted rms ref 1kHz

CCIR weighted quasi-peak ref 1kHz

Hum 50Hz

100Hz

150Hz

250Hz

Noise reference 225W into 8Ω

Left

Right

-102.5dB

-115.5dB

-112.5dB

-120.0dB

-110.5dB

-112.0dB

-104.5dB

-105.5dB

-107.5dB

-120.5dB

-125.5dB

-130.5dB

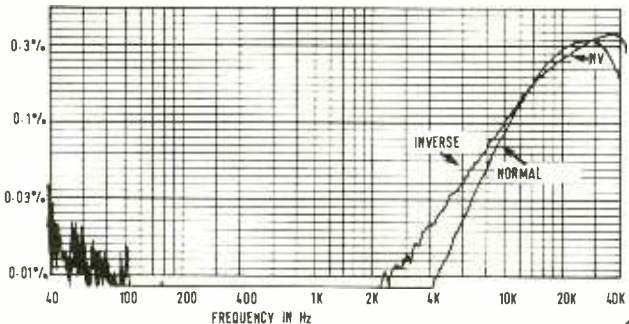
-108dB

-132dB

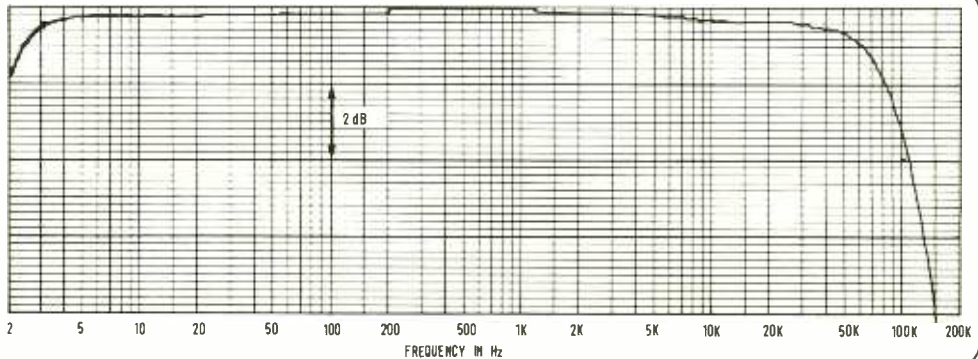
-110dB

-139dB

**FIG.3**  
BGW 750C 5th  
HARMONIC DISTORTION



**FIG.4**  
BGW 750C OVERALL  
FREQUENCY RESPONSE AT 1W



at minimum sensitivity and the floating input impedance changing from 2.6kΩ to 3.6kΩ.

Dc offset at the outputs was found to be low at 4.2mV and 2.0mV with the damping factor relative to 8Ω being 235 at both 50Hz and 1kHz. The front panel clipping indicators were found to be very fast in action and to be accurate with 4Ω loads. However, with 8Ω loads the indicators were found to be set at slightly too high a level with continuous sinewave clipping being possible without indication. This, however, is unlikely to be any cause for complaint with audio signals.

### Other matters

The overall phase response of the amplifier using the unbalanced inputs is shown in **fig 5** which shows that within the audio band the phase shift is negligible and not excessive at very high frequencies where the frequency response rolls off sensibly.

Crosstalk between the two channels was of no concern as shown in **fig 6** at an output of 1W into 8Ω. Recovery from a 10ms burst of 1kHz tone overloading the amplifier asymmetrically by 10dB every 100ms with a continuous tone at half

68 ▶

# A whole page of sound advice from ADR.

## F690 Music-Voice Ratio Limiter

This is an F 600 Broadcast Limiter fitted with a voice operated threshold switching circuit. In use it gives an accurate method of controlling the voice-music ratios, and prevents over-attenuation of the music level. The F 690 is a stereo unit but can be used in mono with one channel for voice and the other for music voice-over control.

## E500 Selective Band Processor

Use it for treating any part of the audio bandwidth. Particularly useful when transferring a recording from tape to disc when treatment of selected troublesome areas of the signal prevent degrading the whole signal. The E 500 can be used with any standard limiters, compressors or expanders that operate at normal time levels and is a stereo unit.

## E560 Selective Limiter

A versatile unit which combines three functions: overall programme limiting, selective limiting and parametric equalising. The E 560 combines the notch section of the E 500 and the F 600 Limiter. A monitor switch means that notch areas for limiting are easily defined and the limiter also operates when peaking or notching in the Equaliser mode.

## E900 Sweep Equaliser

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## E950 Paragraphic Equaliser

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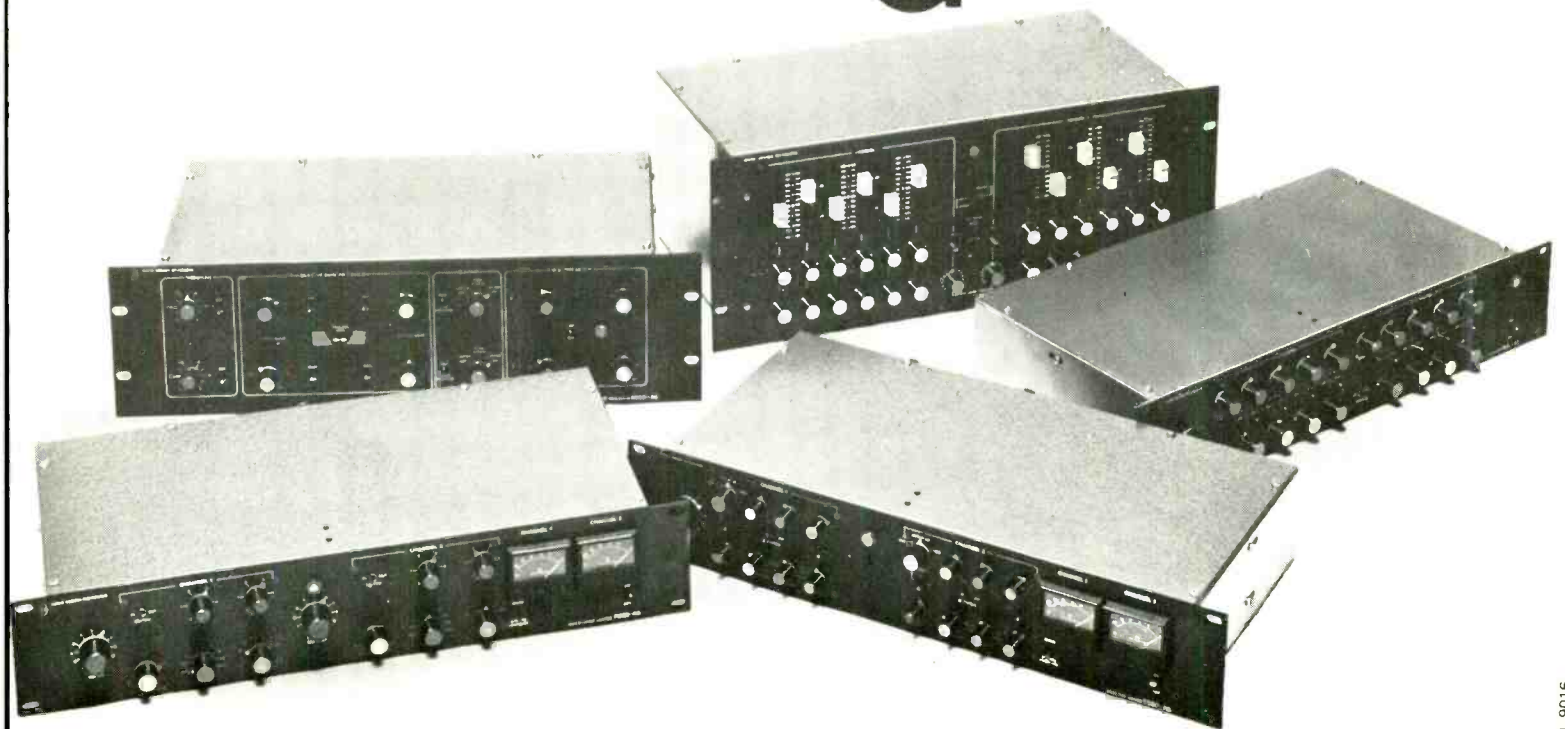




FIG. 5  
BGW 750C OVERALL PHASE  
SHIFT INPUT TO OUTPUT

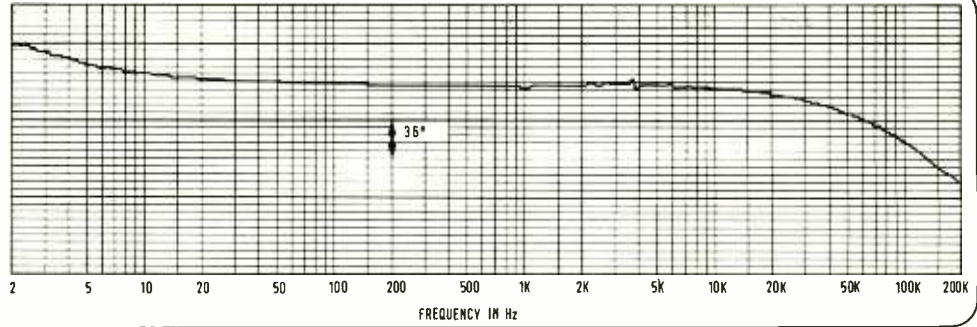
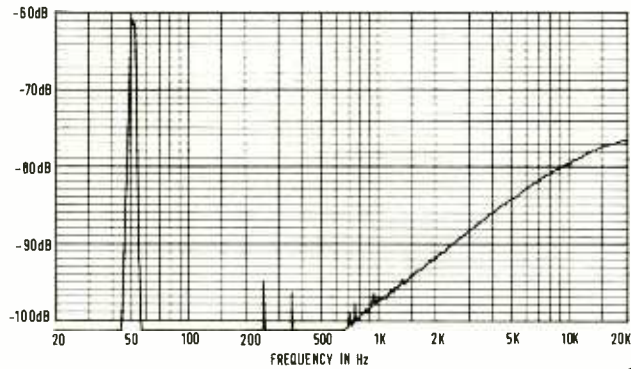


FIG. 6  
BGW 750C  
CROSSTALK AT 1W



rated power was exceptionally clean as shown in the oscillogram fig 7.

Measurement of the rise and fall times showed these to be the same at 3µs, but the application of a 1kHz squarewave into a load of 8Ω in parallel with 2µF produced the overshoot and ringing shown in fig 8.

**Summary**

The BGW type 750C power amplifier is a very well built unit which should be particularly easy to service. Its overall performance was found to be very good with distortion at a very low level. Whilst hum in the output is not exactly excessive there could be some improvement in this direction and also towards reducing fan and power transformer noise both of which were found to be very irritating.

Very sensibly this amplifier has clipping indicators instead of expensive meters which usually serve little purpose and the amplifier ran without any trouble at full power on audio signals without overheating or tripping which only occurred if the output was shorted.

**Hugh Ford**

**PPM3 FOR UNBALANCED INPUTS**

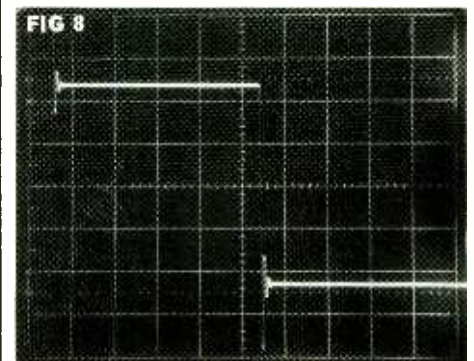
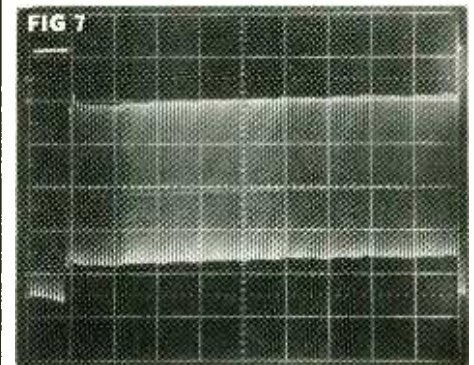
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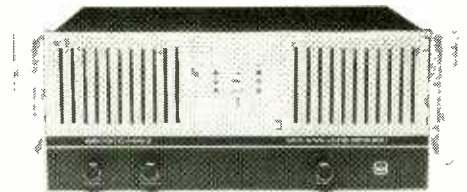
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## Crown PSA-2 amplifier



### MANUFACTURER'S SPECIFICATION

#### GENERAL SPECIFICATION

**General protection:** circuitry limits the output level to protect the output transistor stage, even in the case of high temperature. Transformer overheating results in shutdown (standby) of that channel. Controlled slewing rate voltage amplifiers protect the unit against rf burn-outs. Input overload protection is by a resistor at the input of the amplifier to limit current.

**DC output offset:** (shorted input)  $\pm 10\text{mV}$ .

**Hum and noise:** 115dB below rated output A weighted 100dB below rated output (20Hz to 20kHz).

**Phase response:**  $+0, -15^\circ$  dc - 20kHz at 1W.

**Input impedance:** (XLR balanced)  $20\text{k}\Omega$  (phone jack unbalanced)  $25\text{k}\Omega \pm 30\%$ .

**High voltage power supply:** two 800VA transformers with computer grade capacitors powered through 10A relays.

**Low voltage power supply:**  $\pm 15\text{V}$  dc supplies are provided by a current limited shortproof regulator.

**Power requirements:** 50-60Hz ac with adjustable taps for 100, 120, 200, 220 and 240  $\pm 10\%$  operation. Draws 90W or less on idle 800W at 250W channel into  $8\Omega$ .

**Turn on:** may be switch selected for instantaneous or 4s delay after applying power. No dangerous transients.

**Low frequency load protect:** may be switch selected to produce shutdown (standby) of high voltage power supply for dc outputs greater than 26V or low frequency outputs greater than 26V at 5Hz.

**Controls:** two position on/off rotary switch. Ch 1/Ch 2 input level controls. Low freq protect, delay and stereo/mono slide switches are located at the rear panel.

**Displays:** yellow LED indicates standby mode activated. Green LEDs indicate signal presence at the output. Red LEDs (IOC) indicate amplifier overload conditions. Amber LED power indicator driven by low power control supply.

**Connectors:** unbalanced input  $\frac{1}{4}$ in phone jacks. Output-colour coded dual binding posts on standard  $\frac{3}{4}$ in centres; spaced  $\frac{3}{4}$ in apart for mono (balanced) output connection. ac line -3-wire 20A, 120V male connector with 5ft cable. Ground selectivity -2-lug terminal block with removable shorting strap.

**Module plug-ins:** rear-panel balanced input module.

**Dimensions:** 19in standard rack mount (EIA Standard RE-310-B) 7in height,  $14\frac{3}{4}$ in behind mounting surface. Handles extend  $2\frac{1}{4}$ in in front of mounting surface.

**THE CROWN AMCRON PSA-2** power amplifier is specifically designed for sound reinforcement applications and as such has what I believe to be some unique features and as a result of the high available power involving  $\pm 75\text{V}$  rails, it may be used to drive directly a 70V audio distribution system.

The amplifier, which is equipped with feet and front panel carrying handles, is basically designed for mounting into a standard 19in rack. As fan cooling is used the amplifier may be stacked on top of other amplifiers.

At the base of the front panel are two potentiometer level controls and a rotary on/off switch with LED displays at the centre of the panel indicating the amplifier's status. In addition to the yellow 'power on' LED, there are three further LEDs for each channel consisting of a yellow 'standby' LED, green 'signal' LED and red 'IOC' LED.

The 'standby' indicators will normally be illuminated when the switch on delay is in action but the amplifier also sets itself to the 'standby'

Centre of gravity is 5.4in behind the front panel.

**Weight:** 57lb (25.8kg) net weight.

**Finish:** satinised aluminium front panel, grey suede Lexan insert, black anodised aluminium chassis/covers.

**Construction:** aluminium chassis, 'flow-through' ventilation top front and side panels. Handles to ease transport. Plug-in rear panel balanced input module.

**Heat sinking:** forced air with high efficiency coolers. A 2-speed fan with a washable intake filter mounted on the rear of the amplifier, forces air through coolers and out of the top and sides of the amplifier.

#### STEREO SPECIFICATIONS (exclusive of balanced input module)

**Output power:** 220W per channel minimum rms both channels operating) into an  $8\Omega$  load. 20Hz to 20kHz at a rated rms sum total harmonic distortion of 0.05% of the fundamental output voltage (tested per FTC specifications). 250W  $\pm 1\text{dB}$  per channel. 20Hz to 20kHz into  $8\Omega$  with no more than 1% THD (EIA Std SE-101-A).

**Output power (4 $\Omega$ ):** 400W  $\pm 1\text{dB}$  per channel. 20Hz to 20kHz into  $4\Omega$  with no more than 1% THD (EIA Std SE-101-A).

**Output power (2 $\Omega$ ):** 685W  $\pm 1\text{dB}$  at 1kHz per channel into  $2\Omega$  with no more than 1% THD.

**Frequency response:**  $\pm 0.1\text{dB}$  20Hz to 20kHz at 1W into  $8\Omega$   $+0 -15\text{dB}$  dc -80kHz.

**Harmonic distortion:** less than 0.002% from 20Hz to 1kHz and increasing linearly to 0.05% at 20kHz at 220W into  $8\Omega$ , per channel.

**IM distortion:** less than 0.01% from 0.25W to 220W into  $8\Omega$  per channel.

**Slewing rate:** greater than 20V per  $\mu\text{s}$ .

**Damping factor:** greater than 700 (dc - 400Hz,  $8\Omega$ ).

**Output impedance:** less than  $12\text{m}\Omega$  in series with less than  $1.2\mu\text{H}$ .

**Load impedance:** rated for 16, 8 and  $4\Omega$  usage, safe with all loads.

**Voltage gain:**  $20 \pm 2\%$  or  $26\text{dB} \pm 0.2\text{dB}$  at max gain.

**Input sensitivity:** 2.1V for 220W into  $8\Omega$ .

**Output signal:** unbalanced, dual channel.

#### MONAURAL SPECIFICATIONS (exclusive of balanced input module)

**Output power:** ( $8\Omega$ ) 800W  $\pm 1\text{dB}$ ; 20Hz to 20kHz into  $8\Omega$  with no more than 1% THD (EIA Std SE-101-A). ( $16\Omega$ ) 500W  $\pm 1\text{dB}$ ; 20Hz to 20kHz into  $16\Omega$  with no

mode if it shuts down due to excessive temperature rise and other causes. While normally operating, the 'signal' LEDs illuminate showing that a signal of more than about 1.2V peak is present at the amplifier's output.

IOC (input output comparator) LEDs show that the amplifier is in trouble due to output overload or clipping and in normal operation these indicators serve as clipping indicators.

Turning to the rear panel of the amplifier, to the left is the dual speed thermostatically controlled fan complete with easily removable dust filter. Next to this is a link for disconnecting the amplifier's chassis from the mains earth to avoid hum loops, and a massive fixed mains power cable.

Three screwdriver operated slide switches allow the user to switch between stereo and mono (bridged) operation, switch on or off a turn-on delay and to switch on or off the low frequency protection circuit which puts the amplifier into the standby mode if excessive dc or very low frequency appears at either output, the two out-

more than 1% THD (EIA Std SE-101-A). ( $4\Omega$ ) 1370W  $\pm 1\text{dB}$  at 1kHz into  $4\Omega$  with no more than 1.0% THD.

**Frequency response:**  $\pm 0.2\text{dB}$ , dc -20kHz at 1W into  $16\Omega$ .

**Harmonic distortion:** less than 0.003% from 20Hz to 1kHz and increasing linearly to 0.08% at 20kHz, 500W into  $16\Omega$ . Less than 0.005% from 20Hz to 1kHz and increasing linearly to 0.12% at 20kHz, 800W into  $8\Omega$ .

**IM distortion:** less than 0.015% from 0.25W to 500W into  $16\Omega$ .

**Slewing rate:** greater than 60V per  $\mu\text{s}$ .

**Damping factor:** greater than 700 (dc-400Hz into  $16\Omega$ ).

**Output impedance:** less than  $24\text{m}\Omega$  in series with less than  $2.4\mu\text{H}$ .

**Load impedance:** rated for 16 and  $8\Omega$  usage, safe with all loads.

**Voltage gain:**  $40 \pm 2\%$  or  $32\text{dB} \pm 0.2\text{dB}$  at max gain.

**Input sensitivity:** 2.2V for 500W into  $16\Omega$ .

**Output signal:** balanced, single channel. Channel 1 controls are active; Channel 2 inactive but not removed from operation.

#### BALANCED INPUT MODULE SPECIFICATIONS

**Controls:** Channel 1 and Channel 2 input gain adjust with the agc threshold, is accessible from the rear on the balanced input module.

**Hum and noise:**  $-85\text{dBm}$  equivalent input noise 20Hz to 20kHz,  $600\Omega$  source, gain set at unity.

**Frequency response:** flat  $\pm 0.2\text{dB}$ ; 20Hz to 20kHz.

**High and lowpass filters:** 3 pole Butterworth 18dB/octave; 50Hz and 15kHz standard frequencies.

**Compressor action:** range of compression restricted to 13dB by design (wider range would aggravate feedback in live performance). Threshold adjustable from overload level of main amplifier to 12dB lower.

**Balanced input voltage gain:** variable 0 to 10.

**Test tone:** switch activated wide spectrum 50Hz to 20kHz tone.

**Common mode rejection:** 70dB 5Hz to 3kHz, 55dB 20kHz.

**Price:** £895.

**Manufacturer:** Crown International Inc, 1718W.

Mishawaka Road, Elkhart, Indiana 46514, USA.

UK: HHB PA Hire Limited, Unit F, New

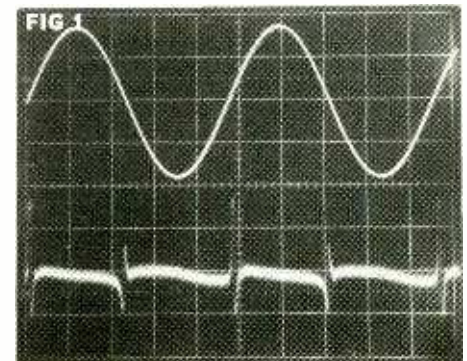
Crescent Works, Nicoll Road, London NW10.

puts being independent in this respect with only the offensive channel reverting to standby.

Inputs and outputs on the main amplifier chassis consist of unbalanced  $\frac{1}{4}$ in jack inputs after the compressor and filters, and banana socket terminal outputs on the standard  $\frac{3}{4}$ in spacing.

The remainder of the rear panel is occupied

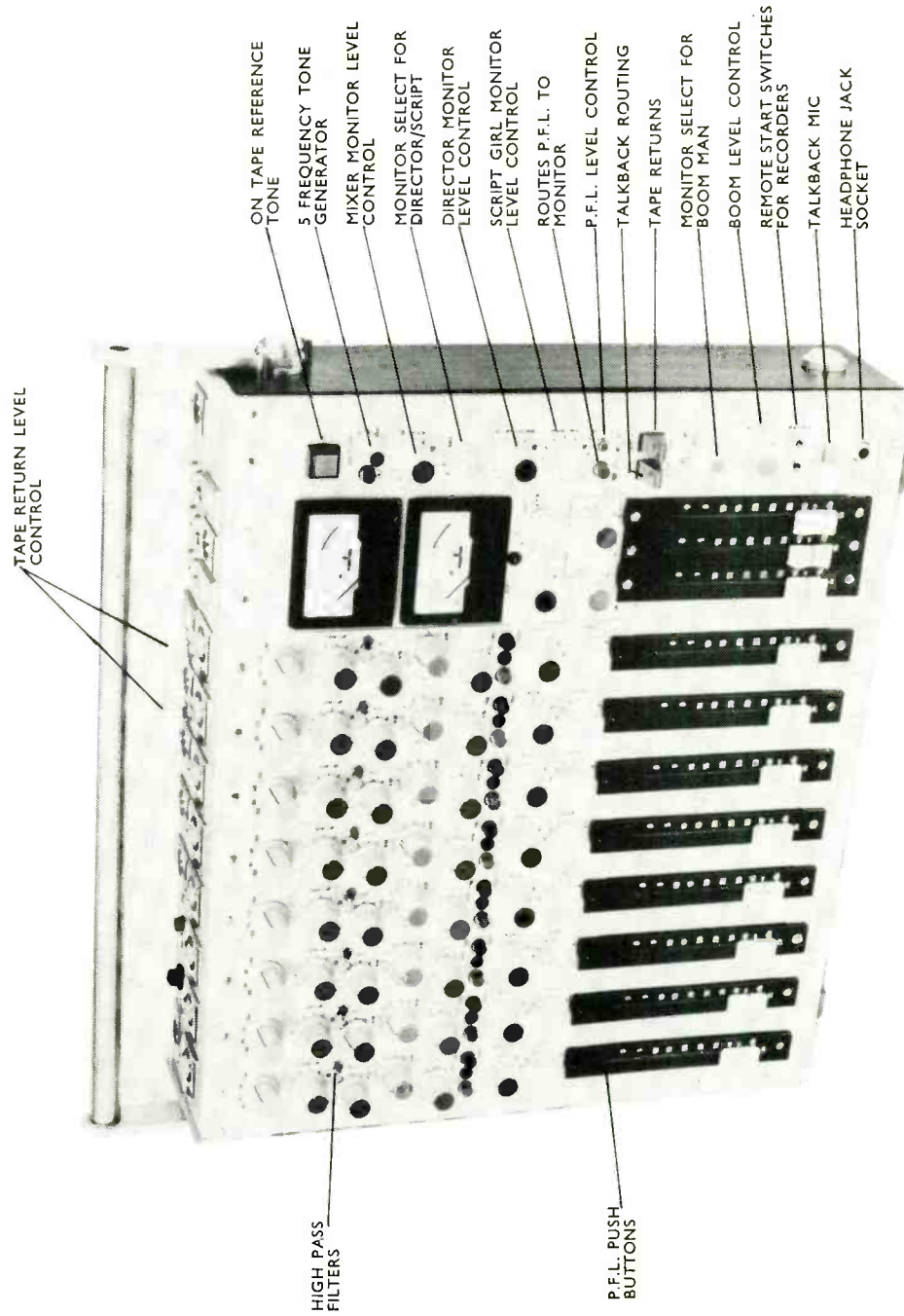
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## reviews

by the PSA-2 balanced input module which includes the filters and the compressors. The inputs to this module take the form of balanced XLR connections feeding an electronically balanced circuit.

Slide switches for each channel allow the high-pass and the lowpass filters to be placed in or out of circuit and simple modifications can change the turnover frequencies as desired by the user. Individual gain controls are fitted for each channel, these being screwdriver operated potentiometers equipped with collet type locks. Finally there is the automatic gain control threshold setting which is a further screwdriver operated potentiometer with a collet type lock and a spring loaded slide switch which inserts a test tone for checking the sound system. This tone takes the form of a differentiated power line frequency squarewave which being rich in harmonics, allows all parts of loudspeaker units to be audibly checked.

Within the amplifier the construction is based on plug-in printed circuit boards of tidy layout and good standard of construction, however, no component identifications are provided for servicing and no layout diagrams provided in the manual. Circuits are however provided.

Located in the base of the amplifier are twin power transformers together with smoothing capacitors and rectifiers, all these being interconnected by push connectors to ease servicing. To the front is a small printed circuit board for the display, with another board to the rear for the low frequency protection circuit. The PSA-2 module is secured to the rear by four screws and is readily removed, the module consisting of two 'piggyback' printed circuit boards with one mounting the controls and the XLR input connectors being wired.

The main audio board is located under the top cover the removal of which also reveals the four output modules each having four parallel drive transistors. Each module comprises a printed circuit onto which the transistors are soldered via a heatsink of a car radiator type construction, through which the fan assisted cooling air passes. Each assembly is secured onto a thin insulating mat by four screws which thread into insulated bushes with the electrical connections being made by pins.

It was this arrangement which revealed what I consider to be a very serious mechanical design fault which resulted in a most impressive firework display within the amplifier and the writer taking a dive for the main circuit breaker!

Unfortunately the mounting plate of the heat-sinks are connected directly to the main 75V dc rails and the chassis onto which they mount is connected to 0V with a clearance of less than 0.025in between the two. It follows that it only takes a very small piece of conductive debris to

fall into the amplifier to produce a direct short circuit across the main 75V rail with a consequent disaster.

At the time of writing I do not have an official answer from the manufacturer about this problem but it could be readily overcome by increasing the size of the insulating mat to cover the complete top surface of the amplifier just allowing cutouts for the module securing screws.

### Power output and distortion

The high power of this amplifier means that extra precautions are needed when measuring the drive capability, as not only can the amplifier deliver well over 1kW but it can also draw in excess of 8A at 240V. Working at 1kHz into both 8Ω and 4Ω loads, the two channels were found to have almost identical clipping points. Working into 8Ω the onset of clipping with both channels operative occurred at 270W or 275W

with single channels driven. With 4Ω loads the appropriate figures were found to be 460W and 470W with an impressive 720W being available into 2Ω with single channels driven.

Using a 10ms burst of 1kHz tone every 100ms, the drive capability at the onset of clipping was significantly in excess of the steady state performance with both channels capable of delivering 315W into 8Ω and with the performance for the two channels into 4Ω being 535 to 545W. As a nominal 4Ω load can fall well below 4Ω the performance into a 2Ω load was checked for single channels with the two channels capable of delivering 710 to 720W at the onset of clipping thus showing that the amplifier can perform satisfactorily into virtually any load.

Checking the half power bandwidth for 0.1% total harmonic distortion showed that this extended to 65 to 70kHz when working into 8Ω or

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FIG. 2  
CROWN PSA-2 TWIN TONE  
INTERMODULATION AT 1W

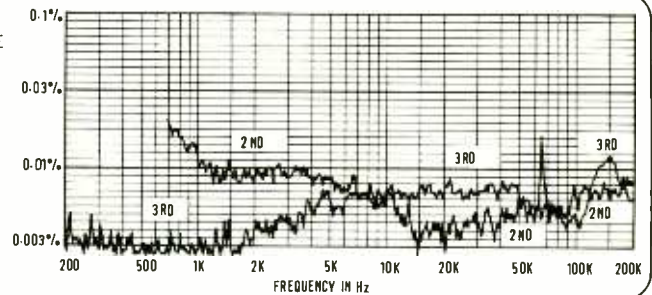


FIG. 3  
CROWN PSA-2 TWIN TONE  
INTERMODULATION  
AT HALF POWER

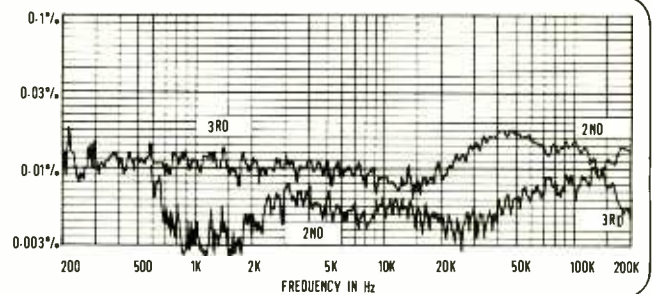


FIG. 4  
CROWN PSA-2 5th  
HARMONIC DISTORTION

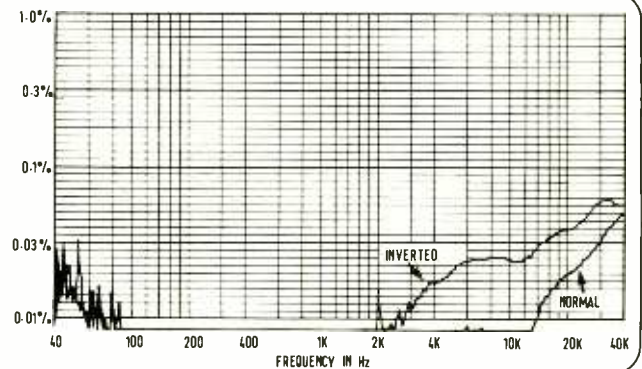
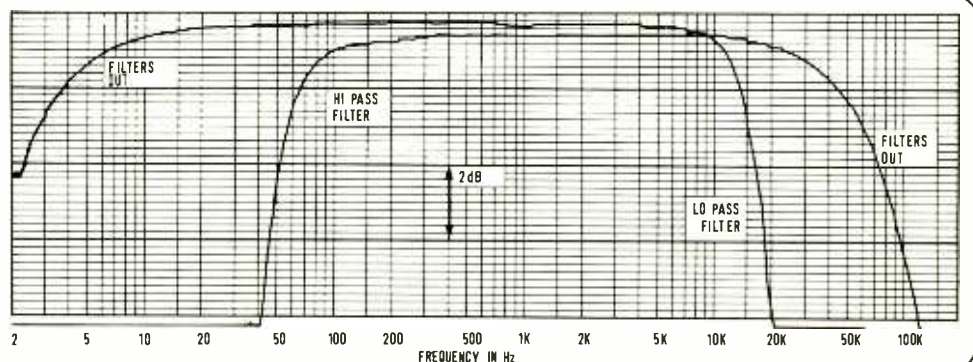
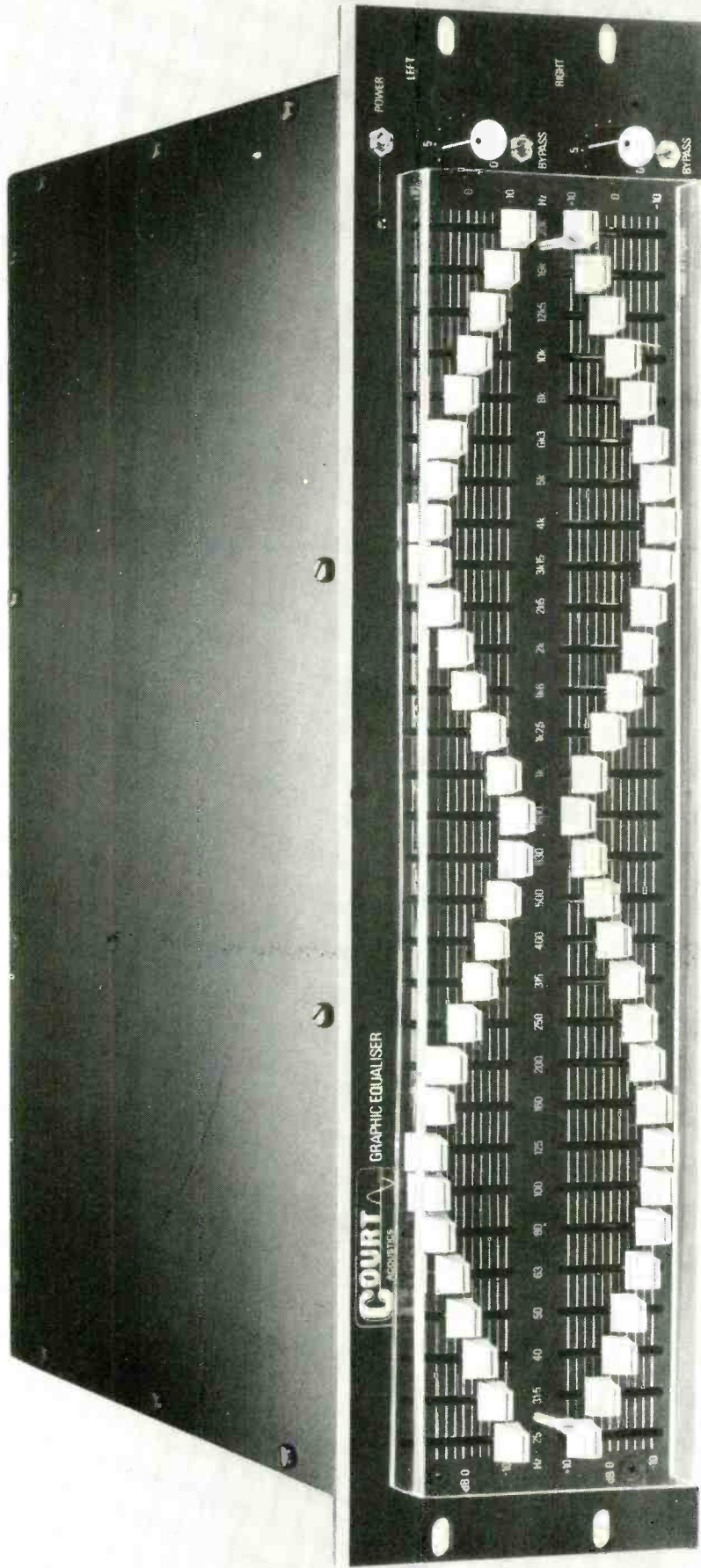


FIG. 5  
CROWN PSA-2 OVERALL  
FREQUENCY RESPONSE



# The Ultimate Equaliser



- 2 Stereo bands of 30 faders with centre click stops giving 20db of control
- Entire audio spectrum from 21hz to 21khz in 1/3 octaves
- Up to 20db of gain
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50 to 80kHz working into 4Ω where there was a rather large difference between the two channels with the amplifier drawing a heavy current from the mains power at high frequencies.

Total harmonic distortion at 1W into both 8Ω and 4Ω was very low with the two channels giving less than 0.0065% total harmonic distortion at 1kHz rising to 0.015% at 10kHz when driving 8Ω or less than 0.009% at 1kHz into 4Ω with the distortion in all cases consisting of crossover artifacts and noise as shown in **fig 1**.

Examination of the twin tone intermodulation performance to the CCIF method using two tones separated by 70Hz showed that this form of distortion was remarkably small at both 1W into 8Ω and at the half rated power into 8Ω as shown in **figs 2 and 3** which approach the residual testgear distortion.

As with the other amplifiers reviewed here, the 5th harmonic distortion was examined using an asymmetrical waveform and it is interesting to note that at high frequencies the distortion varied significantly when the waveform was inverted but remained at a low value as shown in **fig 4**.

**Frequency response and noise**

Reference to **fig 5** shows the overall frequency response from the balanced input module's terminals to the output, together with the performance of the inbuilt filters as supplied which had -3dB points at approximately 50Hz and 15kHz, with the former perhaps being rather high frequency response being as shown for the changed to meet the user's requirements.

When using the jack (unbalanced) inputs the low frequency response extended to dc with the high frequency response being as shown for the 'filters out' plot.

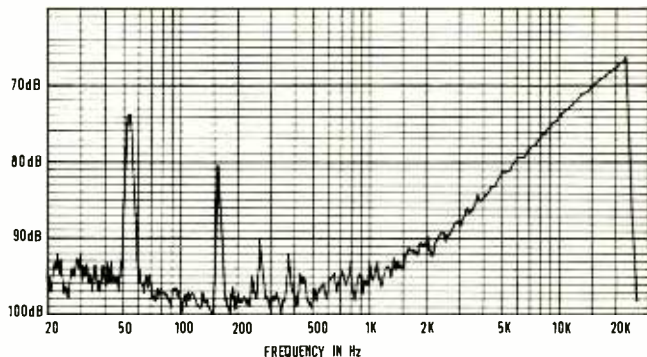
Noise and power line hum were found to remain at a low level at any position of the gain controls with noise as opposed to hum being almost identical in the two channels but hum varying at zero volume setting as shown in **Table 1**.

**Inputs and outputs**

The input sensitivity for delivering 250W into 8Ω at the jack (unbalanced) inputs was found to be 2.24V for both inputs into an impedance of 30.7kΩ, which is more than adequately high. In the case of the balanced input module's inputs, the sensitivity could be varied by the rear panel preset controls from 168mV upwards, with the input impedance remaining constant at 20kΩ. At maximum sensitivity, the input overload point occurred at 0dBm increasing in proportion to the sensitivity setting reaching a maximum

TABLE 1	Noise reference 250W into 8Ω	
	Left	Right
<b>Maximum volume</b>		
22Hz to 22kHz rms band limited	-96dB	-97dB
A weighted rms	-104.5dB	-105dB
CCIR weighted rms ref 1kHz	-97dB	-97dB
CCIR weighted quasi-peak ref 1kHz	-92.5dB	-92.5dB
<b>Minimum volume</b>		
22Hz to 22kHz rms band limited	-112dB	-107dB
A weighted rms	-126dB	-121dB
CCIR weighted rms ref 1kHz	-117dB	-117dB
CCIR weighted quasi-peak ref 1kHz	-113dB	-113dB

FIG.6  
CROWN PSA-2  
COMMON MODE  
REJECTION RATIO



useable input of +21dBm — some care is therefore required when using these inputs to avoid possible overload.

As shown in **fig 6**, having regard to the fact that the input module's inputs are electronically balanced, the common mode rejection ratio is extraordinarily good at all frequencies.

Investigating the automatic gain control in the input module showed that this had a 12dB settable range limiting the output just below full power at maximum and at 10W into 8Ω at minimum settings. As shown in **fig 7**, with the application of a 10dB overload of 1kHz tone, automatic gain control action is fast with full recovery taking about 800ms. This feature therefore is particularly useful for PA work or to protect loudspeakers which cannot take the full power capability of the amplifier.

The dc offset at the outputs was found to be adequately small at 5.9mV and 6.6mV respectively, with the damping factor referred to 8Ω being 807 at 60Hz, falling to 781 at 1kHz as measured at quarter rated power.

The front panel IOC indicators were found to be satisfactorily fast in action with the green signal indicators becoming illuminated at 0.8V rms output.

Low frequency protection when switched into action tripped the amplifier at ±25V output at 2Hz rising to ±40V output at 5Hz such that it

provides useful protection whilst being very unlikely to be accidentally activated by wanted signal.

**Other matters**

Driving a squarewave at 1kHz into 8Ω in parallel with 2μF produced **fig 8** which shows some overshoot with little ringing, the rise and fall times being identical at 8ms with a slew rate of 15V/μs.

Using the input module's balanced input, the automatic gain control took good care of overloads, with **fig 9** showing the effect of driving 10dB into overload with an asymmetrical 10ms toneburst of 1kHz every 100ms. 80 ▶

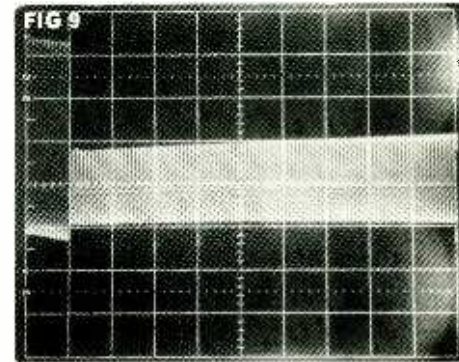
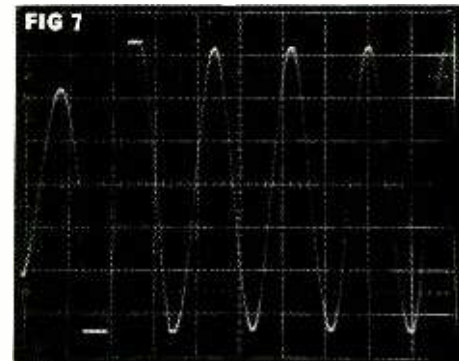
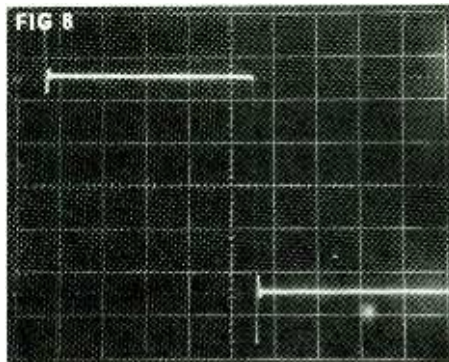
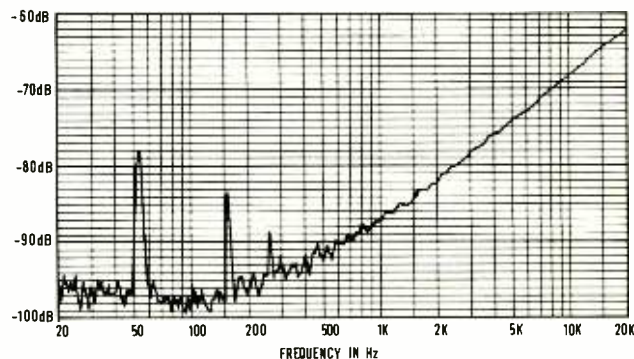


FIG.10  
CROWN PSA-2  
CROSSTALK AT 1W



# - TURNER -

## THE # 1 AMPLIFIER

### Series A — Studio Monitor Series



A300



A300VU



A500



A500VU

### Series B — Professional



B302



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Description and Specification available on request

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## H/H V800 amplifier



### MANUFACTURER'S SPECIFICATION

**Power output at clipping:** 400W rms into 4 $\Omega$ , 1kHz, both channels driven, 260W rms into 8 $\Omega$ .

**Balanced line output:** 80V balanced line (bridged mono).

**Rated power output per channel:** 250W rms into 8 $\Omega$  at less than 0.03% total harmonic distortion over a bandwidth of 20Hz to 20kHz, 390W rms into 4 $\Omega$  1kHz less than 0.02% total harmonic distortion, both channels driven.

**Frequency response:** +0, -1.0dB 10Hz to 50 kHz.

**Total harmonic distortion:** less than 0.02% at 390W into 8 $\Omega$ , 1kHz, less than 0.03% at 250W into 8 $\Omega$  20Hz to 20kHz.

**Intermodulation distortion:** less than 0.03% using frequencies of 50Hz and 7kHz in 4:1 ratio at 400W per channel into 4 $\Omega$ .

**Input sensitivity:** 0.775V for full output into 4 $\Omega$  attenuator set maximum.

**Input impedance:** 15k $\Omega$  minimum, unbalanced optional 600 $\Omega$  or 10k $\Omega$  matching transformers.

**Damping factor (8 $\Omega$ ):** greater than 300 at 100Hz.

**Hum and noise:** greater than 100dB down ref full output, 20Hz to 20kHz.

**Rise time:** 3 $\mu$ s or less (10% to 90%) of 1V, 1kHz.

**Slew rate:** 45V/ $\mu$ s.

**Channel separation:** greater than 70dB at 1kHz.

**Power requirements:** 110/120/220/240V ac 50/60Hz, rear panel mounted voltage selector.

**Input connectors:** 1/4in 3-pole jack socket and XLR 3-31 per channel.

**Output connectors:** two male XLR 3-32 and one pair binding posts per channel.

**Bridged mono output:** 800W rms into 8 $\Omega$  at less than 0.03% total harmonic distortion at 1kHz internal switch for bridged operation, input one operative.

**Indicators:** LED output display, calibrated 'clip', 0, -3, -6, -9, -12, -15, -21, -27, -33dB, thermal shutdown indicator, red LED 'bridged' indicator shows bridged mono operation.

**Protection:** short circuit, open circuit and mismatch proof, thermal guard protects in case of inadequate ventilation, main fuse 10A A/S.

**Load protection:** protection relay energised by presence of a dc fault condition at the amplifier output.

**Dimensions whd:** 19 x 7 x 15 1/2in (483 x 178 x 384mm).

**Weight:** 21.5kg.

**Cooling:** thermostatically controlled, quiet running fan.

**Price:** £528.55.

**Manufacturer:** HH Electronic, Viking Way, Bar Hill, Cambridge CB3 8EL.

THE HH V800 power amplifier is one of four HH models using MOS-FET devices in their output stages. The V800, rated at 260W per channel into 8 $\Omega$ , is the big brother of the models V150-L, V200 and V500 rated at 105W (mono), 65W and 150W respectively.

The four models are similar in construction with the main casing formed from thick sheet metal bolted onto an alloy front panel provided with slots for mounting into a standard 19in rack. Substantial carrying handles are provided at the front, these also giving protection to the front panel controls. Similarly less substantial carrying handles are fitted to the rear panel, again providing protection for the rear panel features.

Turning to the front panel of the V800 this

includes step attenuator gain controls for each channel, a level indicator for each channel, an illuminated power on/off switch and a red LED indicator to indicate thermal shutdown plus a second red LED to indicate that the amplifier is switched for bridged operation by an internal switch. The calibrated step attenuators provide 2dB gain steps from maximum gain to -30dB, then going to -33dB, -37dB, -42dB, -50dB, -60dB and infinite attenuation.

Level indication is by means of two arrays of LEDs styled in the form of conventional meters. To the right a red LED indicates clipping with an adjacent yellow LED showing the rated output level. Below this, green LEDs show 3dB steps to 15dB below rated output, with further LEDs indicating -20dB, -26dB and -32dB below rated output.

Turning to the rear panel, in addition to housing the audio inputs and outputs, this provides the IEC mains power connector with an adjacent properly identified fuse and voltage selector for 240V or 120V operation. Very sensibly there is a removable link for isolating the amplifier's chassis from the power input ground.

The audio inputs take two forms, three pole standard 1/4in jack sockets and XLR connectors. In order to be able to link amplifiers in parallel the XLR connectors are duplicated so that each channel has a male and a female con-

nectors. Whilst both power outputs have the common binding posts/terminals on the standard 3/4in spacing each output also feeds twin XLR-3 plugs which are intended for use with 100V line systems.

Whilst as standard the inputs are unbalanced, the removal of an internal plug allows balancing transformers to be fitted into B9A valveholder sockets within the amplifier—either 600 $\Omega$  or 10k:10k transformers are available from HH. Also, in addition to the standard 240/120V mains input connections, the amplifier may be internally wired for 220/110V operation. Within the amplifier the large E/I core power transformer, the rectifier and the smoothing capacitors are located behind the front panel on a subchassis which spans the width of the amplifier, this subchassis also supporting the optional input transformers and the protection relay.

Behind the subchassis are two black finned heatsinks spanning almost the width of the amplifier, each heatsink supporting eight output devices for each channel. To the right of the heatsinks is a fan which comes into action once a high temperature has been reached, the cooling air being drawn in through a grille to the left of the amplifier. As with so many fans, noise was a problem and also the power transformer was not as quiet as it might have been.

78 ▶

FIG. 1  
HH V800 TWIN TONE  
INTERMODULATION AT 1W

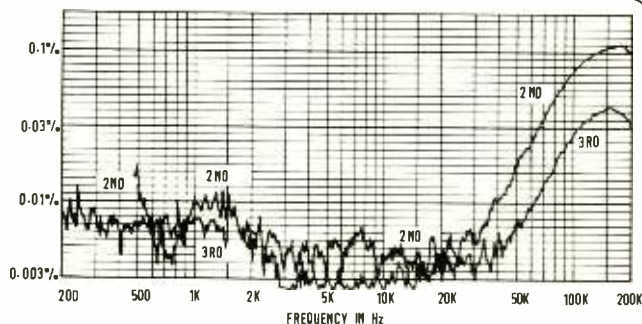
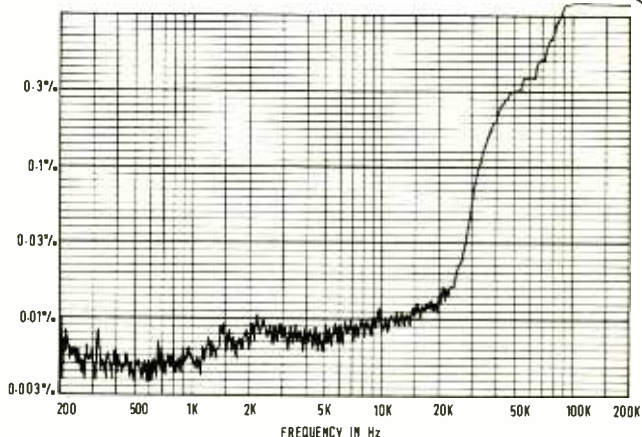


FIG. 2  
HH V800 IM DISTORTION  
AT HALF RATED POWER



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The remainder of the audio electronics are located on a single printed circuit board below the heatsinks, with a further board behind the front panel being associated with the level displays.

Components were properly identified on the printed circuits to ease servicing but no servicing information or circuit diagrams were provided. From a point of view of the standard of construction, both the mechanical and electronic aspects were excellent with the wiring being very tidy and the standard of soldering very good.

FIG. 3  
HH V800 5th  
HARMONIC DISTORTION

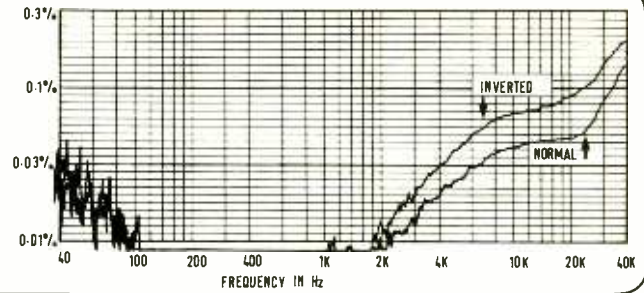
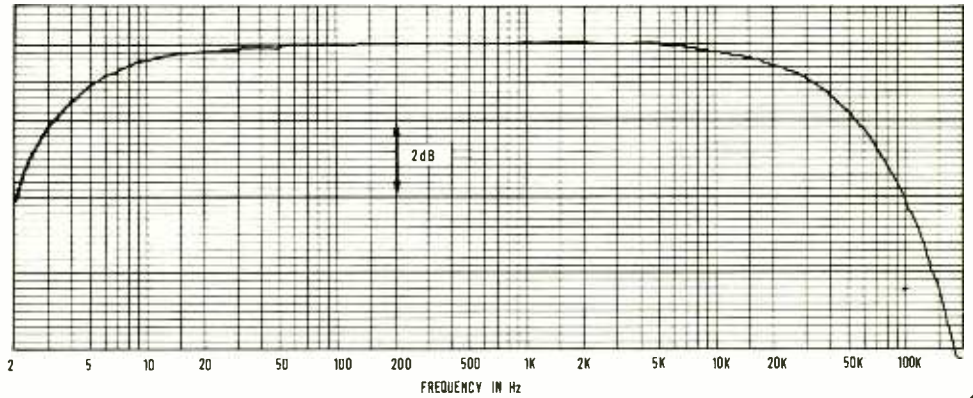


FIG. 4  
HH V800 OVERALL  
FREQUENCY RESPONSE



**Power output and distortion**

When measuring the available output power and distortion, the usual precautions of providing an accurate stabilised mains supply, accurate load resistors and accurate voltage measurement using digital voltmeters were observed. Using a 240V 50Hz input, the clipping points of the two channels were found to be almost identical with both channels driven by 1kHz giving 255W into 8Ω or 410W into 4Ω. As is normal, the amplifier delivered slightly more power with single channels driven, these results being 260W into 8Ω or 455W into 4Ω. Driving single channels into 2Ω (some nominal 4Ω loudspeakers approach this low impedance) the left channel delivered 340W at the onset of clipping at 1kHz with the right channel giving 380W — both performances being quite satisfactory.

As a test of the available power under speech and music conditions, the clipping point using a 10ms burst of 1kHz tone every 100ms was investigated. Again the performance of the two channels was virtually identical with the amplifier delivering 280W into 8Ω or 505W into 4Ω.

The half power bandwidth for 0.1% total harmonic distortion was checked at half the manufacturer's rated power (rating 250W into 8Ω and 390W into 4Ω) and found to extend to

28kHz with 8Ω loads or 19kHz with 4Ω loads, the performance of the two channels being very similar.

Checking the total harmonic distortion at 1W output into both 4Ω and 8Ω at 1kHz and 10kHz showed that the predominant distortion product was the second harmonic. Working into 8Ω the total harmonic distortion and noise was found to be 0.01% at 1kHz or 0.023% at 10kHz with the performance into 4Ω being only slightly worse — a good overall performance with no indication of crossover products.

Intermodulation distortion to the CCIF twin tone method was checked using two tones separated by 70Hz and produced fig 1 at 1W output and fig 2 at half rated power, both working into 8Ω. In both cases the distortion is very low within the audio frequency band, tending to rise above 20kHz. Investigation of the fifth harmonic distortion using an asymmetrical waveform showed that the change in symmetry had little effect as shown in fig 3 which also shows that the level of distortion is low at low frequencies but rises at high audio frequencies.

**Frequency response and noise**

Fig 4 shows the overall frequency response from the input to the output, it being seen that the response is within +0, -0.4dB from 10Hz to 15kHz with -3dB points at 2.5 Hz and 70kHz. It is felt that the response extending to such low frequencies presents a potential haz-

ard as even overloading the amplifier at 2Hz failed to operate the dc protection — there being a consequent hazard to loudspeakers.

As can be seen from Table 1, the noise and hum performance depended to a great deal on the setting of the level controls, the most sensitive settings giving the worst performance with mains frequency hum making a large contribution to the unweighted measurement.

**Inputs and outputs**

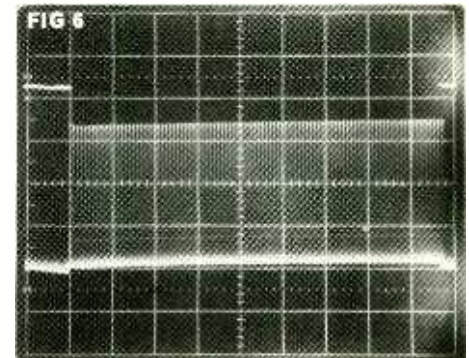
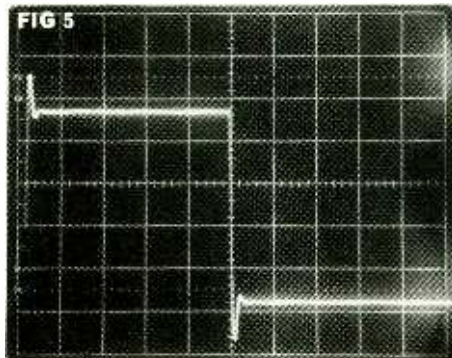
With the input gains set to maximum, the input level at 1kHz required to deliver the rated output of 250W into 8Ω was found to be 808mV for one channel and 796mV for the other, a difference in the order of only 0.1dB.

Checking the performance of the input level controls showed their balance to be accurate with the calibrations of the gains being within 0.5dB over the entire range. Input levels in excess of +22dBm could be accepted without any problems. Measurement of the input impedance showed this to vary mildly with the input gain settings, the maximum input impedance of 19.7kΩ occurring at minimum gain, falling to a perfectly acceptable 15.2kΩ at maximum gain.

At the outputs, the dc offset was minimal at 4mV and 6mV with the measured damping factor being 130 at 60Hz falling to 105 at 1kHz. As previously mentioned I am not at all happy about the dc protection at the output; however, this could be a sample defect. 80 ▶

Table 1

	Noise Reference 250W into 8Ω	
	Left	Right
<b>Maximum gain</b>		
22Hz to 22kHz rms	100dB	93dB
A weighted rms	108dB	103.5dB
CCIR weighted rms ref 1kHz	106dB	103dB
CCIR weighted quasi-peak ref 1kHz	100dB	96dB
<b>Minimum gain</b>		
22Hz to 22kHz rms	106dB	103dB
A weighted rms	112dB	113dB
CCIR weighted rms ref 1kHz	107.5dB	106dB
CCIR weighted quasi-peak ref 1kHz	102dB	98dB







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**Other matters**

Driving the amplifier with a 1kHz squarewave into a load of 8Ω in parallel with 2μF gave the output waveform shown in **fig 5** showing a degree of controlled overshoot without any signs of instability. When working into a pure 8Ω load, the rise time was found to be 3.5μs with a fall time of 3μs (10% to 90% points) with a slew rate of 10V/μs.

The result of driving the amplifier into severe overload by running continuously at half power and then applying a +10dB burst of 1kHz tone asymmetrically clipped is shown in the oscillogram **fig 6** which illustrates a very clean recovery from severe overload.

Crosstalk between the two channels when delivering 1W into 8Ω is shown in **fig 7** which shows a good performance. Overall phase shift as shown in **fig 8** is as might be expected with the gain falling rapidly at very high frequencies.

Checking the level indicators showed that they were not true peak reading and that under sinewave conditions working into 8Ω the clip indicators had a 1dB margin with clipping into 4Ω occurring at the 0dB indication. Also the indication was not particularly fast, requiring

20ms to reach the point 3dB below the equivalent steady state indication.

**Summary**

This is a particularly well built amplifier involving a high standard of overall construction with attention to detail. The input and output facilities make this unit particularly suitable for PA

work where it may be required to connect the inputs of several amplifiers in parallel and also to provide multiple outputs from each amplifier.

Overall the performance was good but some further attention to the routing of low level signal leads could improve the mains hum performance.

**Hugh Ford**

FIG. 7  
HH V800  
CROSSTALK AT 1W

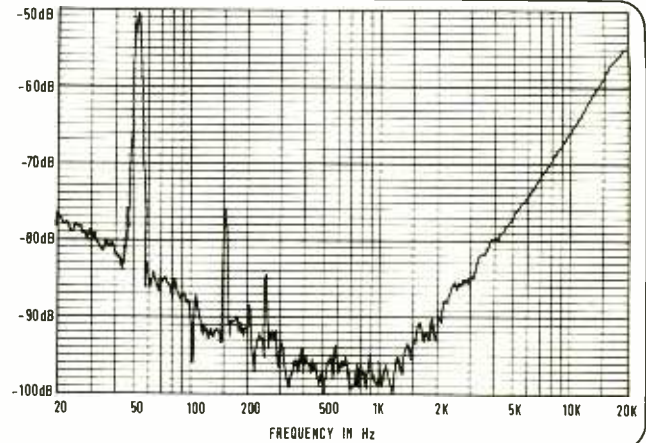
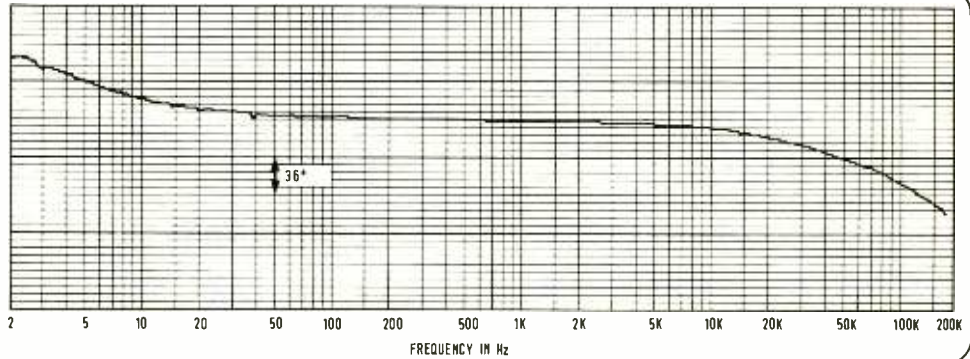


FIG. 8  
HH V800 OVERALL PHASE  
SHIFT INPUT TO OUTPUT



**Crown PSA-2 amplifier**

Crosstalk between the two channels at 1W output into 8Ω is shown in **fig 10** which demonstrates an excellent performance with the overall phase shift from the balanced input module to the output being shown in **fig 11** with all filters out of circuit.

**Summary**

Subject to the manufacturer modifying the amplifier to reduce its potential for pyrotechnics, and to an extent improving the servicing information, this is a very well built amplifier

which is quiet in operation when the fan does not go to high speed — it then is too noisy.

The overall performance was found to be of a very high standard and as with other Crown Amcron amplifiers, this unit appeared to be capable of suffering much abuse.

The PSA-2 balanced input module does not affect the performance of the amplifier at the maximum threshold setting but provides a useful feature for protecting loudspeakers as does the 15kHz lowpass filter. In addition the automatic gain control will find applications in PA work when it is required to intentionally limit power.

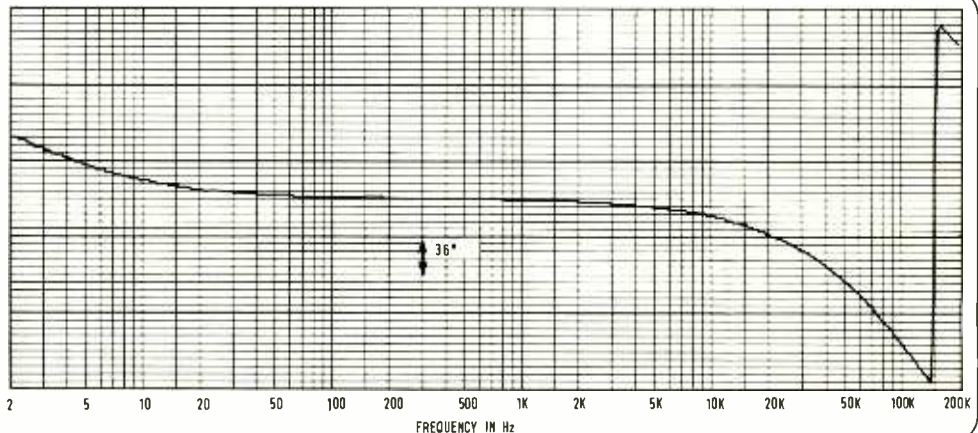
**Hugh Ford**

**Manufacturer's comment:**

Bearing in mind the problem encountered by Hugh Ford with the output module, the chassis under the output modules is now being painted to reduce the likelihood of shorts occurring. In addition, new gaskets are being used to insulate between the chassis and output modules. This is a single continuous gasket adding further insulation around the edges of the module.

**Crown International**

FIG. 11  
CROWN PSA-2 OVERALL  
PHASE SHIFT INPUT TO OUTPUT



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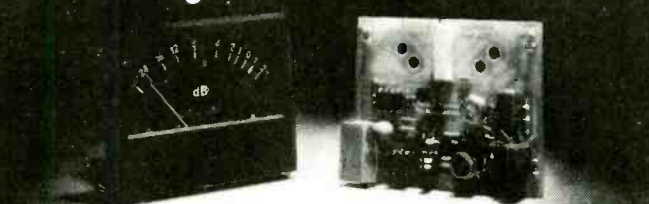
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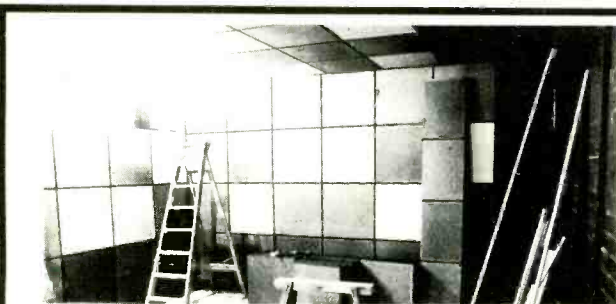
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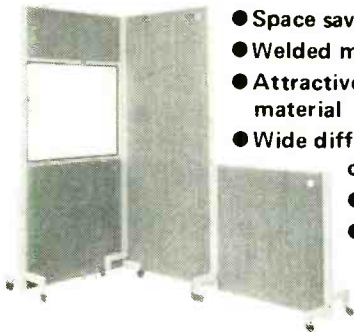
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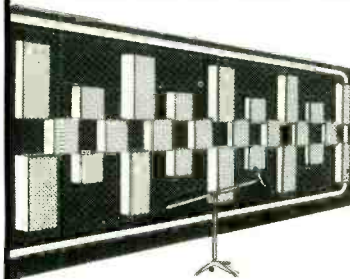
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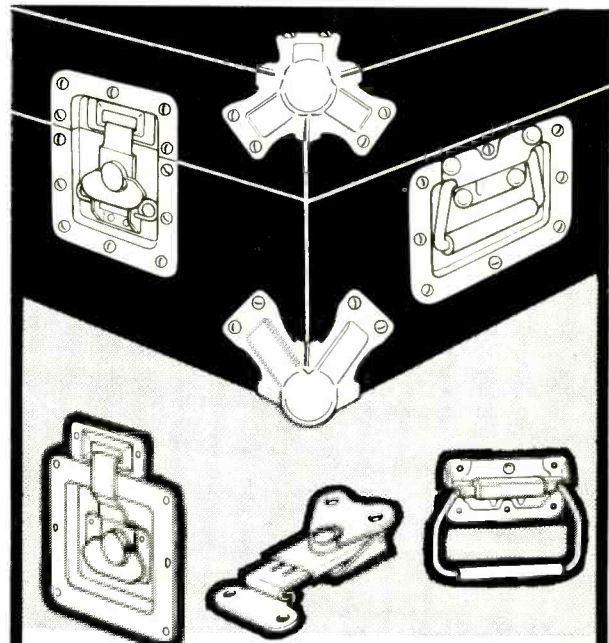
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Our SS.100 and SS.50 are economical amplifiers with outputs of up to 175 and 100 Watts RMS into 4-16 ohms, typical THD figures being 0.1%, slewing rate > 10v/ $\mu$ s, noise > 90dB down, zero level input, and full electronic protection. Considering these points with their proven reliability and robust construction, plug in output transistors and driver board, optional balanced input and 100V line output, and virtually ex stock despatches we reckon we take some beating! Contact us now for the full technical specifications.

Manufacturers of mixers, integrated mixer amplifiers and slave amplifiers, studio power amplifiers, transformers, lighting control equipment and cabinets for the home and export markets. Contact us for full illustrated technical brochures.

## MUSTANG COMMUNICATIONS

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England  
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Spring Reverbs are notorious for the odd sounds that they tend to produce. Many manufacturers have tried to remedy this with limiters, equalisers and the like. In the design of 'The Great British Spring' we took a different approach. We started out with a custom spring unit that sounds good without any fancy electronics. The unit simply has a variable line input and a stereo output.

The six spring paths produce a natural sounding reverberation that is full at the low end and sparkling on the highs. But don't take our word for it. Fifty pence brings you our demo cassette, or drop in and hear it live.



Exclusively from:  
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**Studio Equipment Services,  
The Studio Shop, Oxgate Farm,  
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Telephone: 01-240 0084/5



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**Note:** Advertisement copy must be clearly printed in block capitals or typewritten.

Replies to Box Nos. should be addressed to the Advertisement Manager, Studio Sound, Link House, Dingwall Avenue, Croydon CR9 2TA, and the Box No. quoted on the outside of the envelope. The district after Box No. indicates its locality. **SEX DISCRIMINATION ACT 1975:** No job advertisement which indicates or can reasonably be understood as indicating an intention to discriminate on grounds of sex (e.g. by inviting applications only from males or only from females) may be accepted, unless (1) the job is for the purpose of a private householder or (2) it is in a business employing less than six persons or (3) it is otherwise excepted from the requirements of the Sex Discrimination Act. A statement must be made at the time the advertisement is placed saying which of the exceptions in the Act is considered to apply.

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## SERVICES

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Long or short runs.  
Blank cassettes supplied in bulk.  
A growing reputation for reliability.

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Blank cassettes supplied between C-3 and C120.  
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We can copy from 100 to 5,000 high quality cassettes on our high speed loop-bin system. Load them precisely into top class shells. Price includes library case and all production work from your ¼in. edited master. Any length C-5 to C-90. Ring for price check.  
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announces a series of free

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A demonstration of Audio Visual presentation of Signal Processing Equipment and its application in Recording, Broadcasting and allied fields.

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Audio and Design Recording Ltd.  
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Reading  
Berks RG1 1BR



★A quality pressing and duplication service provided to studios, etc. Complete with cutting, processing, labels, sleeves, art work, inlays, etc. Minimum order for LPS—250, singles—500, cassettes—250. Example price for complete 46 minutes cassette to include mastering, printed label and library case, on Agfa tape—80p each plus VAT. For further details: SRT Record and Tapes Ltd., 01-446 3218. **X**

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Fast turnaround, reliable service  
**LOW COST**  
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**From 33p**

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**SPEECH-PLUS RECORDINGS LTD**

32, PAGES WALK, SOUTHWARK, LONDON SE1 4SB.

01-231 0961/2

Quantity	CASSETTE DUPLICATING inc L/case.										Label and inlay card printing.					
	C1-10	C11-20	C21-30	C31-40	C41-50	C51-60	C61-70	C71-80	C81-90	C91-100	C101-110	C111-120				
10-49	51p	53p	55p	59p	63p	67p	72p	80p	87p	97p	107p	117p				
50-99	48p	50p	52p	55p	58p	61p	68p	76p	84p	94p	104p	114p				
100-149	47p	49p	51p	52p	54p	56p	63p	72p	79p	89p	99p	109p				
150-249	43p	45p	47p	48p	50p	52p	60p	69p	74p	84p	94p	104p				
250-499	41p	43p	45p	46p	47p	48p	56p	64p	70p	80p	90p	100p				
500-999	39p	40p	41p	42p	43p	44p	51p	59p	67p	77p	87p	97p				
1000+	33p	35p	37p	38p	40p	42p	48p	54p	64p	74p	84p	94p				
10,000+	32p	34p	36p	37p	39p	41p	47p	53p	63p	73p	83p	93p				

R.F.W. RECORDING SUPPLIES 50 Bedford Lane, Feltham, Middlesex. Tel: 01-890-6460

★New Wollensak cassette copiers directly imported by C.A.V.S. Ltd., cost less and have full service/spares back up. E.g. Wollensak 2770 still costs £999 plus V.A.T. Also available Telex Copuette at £299 plus V.A.T. and all other Wollensak, Telex, Pentagon similar units. Contact Yates, C.A.V.S. Ltd., 01-363 6125. X

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16 TRACK Acoustically Designed  
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01-435 3076 or  
01-637 9977



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★**Vinyl pressings** from your tapes. Labels. S.A.E. for list. Deroy Records, P.O. Box 2, Morecambe, Lancs. X

★**Disc Cutting** master and demos, pressings, cassettes, mobile recording studio. Free brochure. TAM Studio, 13a Hamilton Way, London N.3. Tel. 01-346 0033. X



John Smiles

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From £15.00 per hour + tapes.  
01-404 5711, ext. 55, office hours

★**Accurate level control** starts with a Cathedral LA3 comp/limiter module, from £30 per channel. Telephone Halsall (0704) 840328. B

**COUNTY RECORDING SERVICE**  
For super quality Master Discs, Demo Discs and Pressings. Scully lathe with our latest MKW 80 Stereo Cutting System.  
Also half speed cutting for that very special disc.  
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RG12 5BS  
Tel. BRACKNELL (0344) 54935

**FOR SALE—TRADE**  
★**Add accurate level control** to your mixer with the Cathedral LA3 comp/limiter module. Excellent performance at moderate cost. Build your own mixer with Cathedral low noise channel modules dispatched post free to any part of the world. Cathedral Sound Ltd., Fourways, Morris Lane, Halsall, Lancs L39. Tel. Halsall (0704) 840328. X

**CASSETTE COPYING IN THE MIDLANDS**  
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Write or phone for rate card to:  
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10 The Chapel, Shilton Road, Barwell, Leics  
LE9 8HB. Tel. 0455-47298 (24 hr. answering service)

★**Bose 802 speakers** with equalisation, £499 per pair or £473 without equalisation. Amcron DC 300 £530 and D150A at £335. All prices plus VAT. Contact Geoff Yates, C.A.V.S. Ltd. 01-363 6125. X

**SOWTER TRANSFORMERS**  
WITH 37 YEARS' EXPERIENCE  
we have the expertise to design and manufacture ANY TYPE OF AUDIO TRANSFORMER AT THE RIGHT PRICE  
WE SUPPLY ALL TYPES OF MICROPHONE, TRANSFORMERS, BRIDGING TRANSFORMERS, INPUT TRANSFORMERS FOR RECORDING, BROADCASTING AND PUBLIC ADDRESS APPLICATION.  
We call your attention to our very successful MICROPHONE SPLITTER/COMBINER TRANSFORMER type 4079  
with a high impedance 200ohm primary and two 200ohm secondaries. It will handle up to 2.3 volts rms at 30Hz and has a frequency response of plus/minus 4dB from 20Hz to 20kHz. It is contained in a Mumental Can 33mm diam x 37mm high and WORKING DETAILS OF THE CONSTRUCTION OF A SPLITTER ARE AVAILABLE ON REQUEST.  
WE HAVE AVAILABLE STANDARD DESIGNS OF OUTPUT TRANSFORMERS WITH EXCEPTIONAL PERFORMANCE FOR ALL TYPES OF VALVE AMPLIFIERS.  
**E. A. SOWTER LTD.**  
Manufacturers and Designers  
P.O. Box 36 Ipswich IPI 2EG England  
Tel. Ipswich (0473) 52794 and 219390.

**STOP PRESS**  
**NOW AVAILABLE FROM FELDON AUDIO**  
We can supply single edged razor blades for your tape editing  
Not usually obtainable in the UK  
£5.00 per 100  
While stocks last  
(Plus VAT)



Feldon Audio Ltd.  
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London WIN 5PH  
Telephone 01-580 4314

**BROADCAST CARTRIDGES**  
Large selection available ex stock.  
Competitive prices. Standard lengths.



★**For sale, secondhand equipment.** Two Neumann VG 66 racks with 100 watt cutting amplifiers and tracing simulators, £1,000 each. One x Neumann SX 68 cutterhead £975. Two Telefunken M10 tape transports with advance heads (for disc cutting) and preamplifier boards, £475 each. Four x 15in. Tannoy HPD speakers in Lockwood cabinets, £275 per pair. 100 virgin reels 1in. Scotch 206 tape, @ £20. Call Pete Norman or Simon Dass at RCA Custom Recording, 01-734 2998. H

**WANTED**  
★**Wanted.** Studio Sound, volumes 18, 19 complete. Tel. 0246 75479 evenings. H  
★**Wanted:** two record-replay modules for Studer A-62, also head-block. Units in any condition. Sound Dept., Royal Opera House. 01-240 1200. H

Custom winding. Lubricated tape.  
Also full range of tape cartridge storage systems.

**JOHN A. STEVEN**  
Professional Recording Equipment  
Brentwood (0277) 215485



Have you seen the superb new Uher portables with monitoring head?

They are actually in stock and at competitive prices at:

**SIMMON**

SOUND AND VISION

28a Manor Row, Bradford I, W. Yorks.

Telephone: 0274 307763

★Yorkshire Erricks of Bradford. Tascam, JBL, Bose, AKG, Beyer, Calrec, Revox, Ferrograph, Spondor. Sales, servicing, exchanges, leasing. Bradford (0274) 22972 (Paul). X

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Philips EL3503 Tape Deck minus head blocks	... ..	£45
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Rank Wdw and Flutter Meters, 1740	... ..	£50
Carriage and V.A.T. extra.		

86 BISHOPGATE STREET, LEEDS LS1 4BB  
0532 35649

## TANDBERG UHER REVOX NEAL-FERROGRAPH

For the best prices  
and Service

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255a St. Albans Road,  
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or at

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### STUDIOS—SAVE A BIT OF THE READY— READ ON!

(Sound equipment for sale)

All the following items have had little use and therefore are in excellent condition.

★ 40 Reels of unused Scotch 206 ¼" tape of NAB spools £6.50 each ★  
★ 4 AKG D1200E microphones £45.00 each ★  
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★ 2 AKG-Tapco 6 into 2 mixers (nice sound and tough) £325.00 each ★  
★ 4 A77 Revox power amp cards (free installation) £30.00 each ★  
★ 1 pair of AKG K160 headphones £25.00 ★  
★ 4 Peerless DT10HFC 8 ohm dome tweeters £5.00 each ★  
★ 6 10m mic leads XLR-XLR £15.00 the lot ★  
Offers acceptable—phone PURIST SOUND TECHNIQUES after seven on 01-948 1331

★Fantastic sound. Bechstein model C grand piano. Completely reconditioned. Hand French polished in black. Ten year guarantee, £3,950. 01-897 9670. H

★Stereo plate echo. Brand new, £600 plus VAT. Trade enquiries welcome. Smile Studio Sales. Steve Foley, 061 226 5369. L

## SITUATIONS WANTED

★Arriving London early October, one commercial production sound engineer, five years studio experience, prior to that, ten years T.V. sound. Needs to learn new techniques, but has some good ones of his own. Has one international and two National Awards, is 31 years of age but doesn't look it. One drawback: he is Australian—hope you won't hold it against him. All enquiries: L. W. Francis, 2 Severn Street, Gilberton, Adelaide, Australia. H

## SITUATIONS VACANT

★Record pressing plant on threshold of expansion seeks Technical Manager. Experience in industry essential. Permanent position, excellent prospects. Box no. 831, c/o Studio Sound. H

## FOR SALE—PRIVATE

★Stellavox Model SP7 portable stereo recorder. With accessories including case, power supply and ABR large reels adaptor. In immaculate condition, £1,200. Godstone (0883) 843221. J

★Mixer, 18 into 4, in flight case with full eq, foldback etc. Complete with 100 metres multi-core and stagebox. One owner, low mileage. £2,250 ono. Brighton (0273) 607384. J

★24-8/8 Alice Mixer. PPM metering, P. & G. faders, in all wood console, £4,000. Brenell mini 8, 1in. 8-track, two years old, £2,700. Raindirk 10-4/4 mixing console, PPM metering, £1,250. Various acoustic screens, offers. Tel. Chief Engineer, 01-734 5572. X

★AMPEX MM1100 24-track tape recorder with autolocate and varispeed. Excellent condition. Price £14,250. 2 Ampex AG440 stereo mastering machines in consoles. 3 Scully stereo mastering machines in consoles. Offers. Contact Studio Manager on 580 9956. X

★Two Amcron VFX2 active crossovers. Dual H.P. and L.P. filters can give 3 band mono operation, £150 each. 01-607 0733. H

★One pair Cadaes (small) monitors with spare bass units, one pair Triad parametric equalisers, one Allison 65K programmer, one Master room reverb unit, two Audix stereo power amps. Open to offers. Tel. 01-247 1311. H

★Audio Developments ADO31 mixer, £900. Quad 405, 33 FM3 £400. Dual CS 701 turntable with V15 111 cartridge, £70. Telephone Hornchurch 59909. H

★Philips test equipment. PM 5165 log sweep function generator, PM 5171 AC/DC log converter. Mint condition, £600 o.n.o. Woking 4866. H

## TECHNICAL FIELD SALES ENGINEER

Required by an expanding and well established company manufacturing a wide range of professional mixing and recording equipment.

The successful applicant will be fully conversant with current multi-track recording techniques and would be required to maintain, install and trouble shoot our range of professional products in the UK and abroad.

Proven qualifications are not necessarily required as more importance is placed on good practical experience and the ability to communicate at any level in the audio profession.

If you require a demanding, satisfying career with good promotional prospects, competitive salary, company car, etc., then please apply in writing, giving personal details and experience to **BOX No. 835, c/o Studio Sound.**

All applications are treated in the strictest confidence

## SITUATIONS VACANT

### STUDIO ENGINEER

A leading London recording studio is currently seeking to employ an experienced Balance Engineer with a view to attracting new clients. Please send CV with full details to **Box No. 836.**

WE ARE OFFERING A PROMINENT POSITION IN THE AUDIO MARKET IN ITALY FOR:

PRODUCT MANAGER FOR PROFESSIONAL AUDIO PRODUCTS, STUDIO AND SOUND REINFORCEMENT.

CHIEF TECHNICIAN FOR SERVICE OF ABOVE MENTIONED PRODUCTS.

OFFRIAMO POSIZIONE DI RILIEVO NEL SETTORE AUDIO ITALIANO PER: PRODUCT MANAGER DI PRODOTTI PROFESSIONALI, STUDI DI REGISTRAZIONE E SONORIZZAZIONI.

CAPO TECNICO PER L'ASSISTENZA DEI PRODOTTI SOPRA MENZIONATI.

### AUDIO CONSULTANTS S.P.A.,

Professional Division

Via Venturi 70

41100 Modena-Italia

Phone: 59/225762

Tx.: 511510

### AUDIO KINETICS (UK) LIMITED



#### SALES ENGINEER

Applicants should be experienced in electronics, prepared to travel, age 23-35 and preferably familiar with pro audio and video techniques.

#### SOFTWARE ENGINEER

Applicants should have 2-3 years experience with 6800 programming and be prepared for challenge.

Applications in writing to Ian Southern,

Audio Kinetics (U.K.) Ltd.,

Verulam Road,

St. Albans,

Herts. AL3 4DH

### ADVISION RECORDING STUDIOS

Have a vacancy for a Senior Technical Engineer. The post includes a wide range of duties, but primarily the applicant will be involved with the maintenance, development and installation of recording equipment at our London based Studios.

The successful applicant will have a sound electronic knowledge coupled with a good background in digital technology.

Applications in writing please to:

Roger Cameron, Advision Recording Studios,  
23 Gosfield Street, W.I.

Inner London Education Authority

## Learning Materials Service, Television Centre, Thackeray Road, London SW8 3TB.

The Television Centre produces a range of educational programmes distributed in the form of 16mm film, videocassettes and sound cassettes. The sound section of five members works with professional equipment (Neve, Studer, Sandor, ITC etc.) to provide an audio component of high standard.

## VACANCIES EXIST FOR :

### (1) HEAD OF SOUND (ST4)

To lead the section and also to mix and process many of the programmes. He/she will be responsible for training new staff, and with the Chief Engineer and others will also undertake responsibility for the equipment and for its purchase and maintenance.

Applicants should have suitable theoretical qualifications, with at least 10 years of relevant experience at senior level. A good working knowledge of all sound operations associated with television and film is essential.

Salary is within the scale £7,901.64 to £8,375.64 (this is under review from July 1980).

### (2) SOUND ASSISTANT (ST2)

The work is largely film recording using the Nagra, but with periods of studio duty (rigging, boom operation, tape and grams etc.). Working hours are based on a flexible 35 hour week exclusive of meal times. Travel to locations is involved. Occasional overnight stops are required.

Although applicants should have a thorough knowledge of sound techniques in a film and television environment, consideration will be given to those who are willing to learn, have appropriate technical qualifications, and experience elsewhere in the sound recording field.

Salary is within the scale £6,170.64 to £6,896.64 (this is under review from July 1980).

Further information and application forms from EO/Estab. 1C, Room 365, The County Hall, London SE1 7PB. Telephone No. 633-7456/8848.

Closing date: 14 days after the appearance of this advert.



# Sony Broadcast Ltd

During the last year we have sold professional broadcast television equipment and systems to more than 90 organisations in 20 countries. Now further planned expansion of both our domestic and international markets has created the following vacancy:-

## Manager Audio Department

£ negotiable plus car

Reporting to the General Manager, Sales, the successful applicant will be responsible for giving product planning advice to the various international design groups. Qualifications to degree level or equivalent in electronics or a related discipline and several years' experience in the development of professional audio products are desirable. Experience in digital audio processing would be a great advantage.

Travel to Japan and Europe for product briefing and technical support would be necessary.

This position carries an excellent salary and fringe benefits normally associated with a large international company, including relocation expenses where appropriate. The above appointment is open to both male and female applicants.

Please write in strict confidence to Barry White, Personnel Manager, giving details of qualifications, experience and present salary.

**SONY**  
Broadcast



### Sony Broadcast Ltd.

City Wall House  
Basing View, Basingstoke  
Hampshire RG21 2LA  
United Kingdom

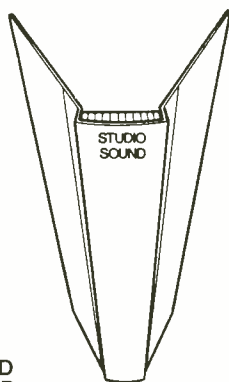
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